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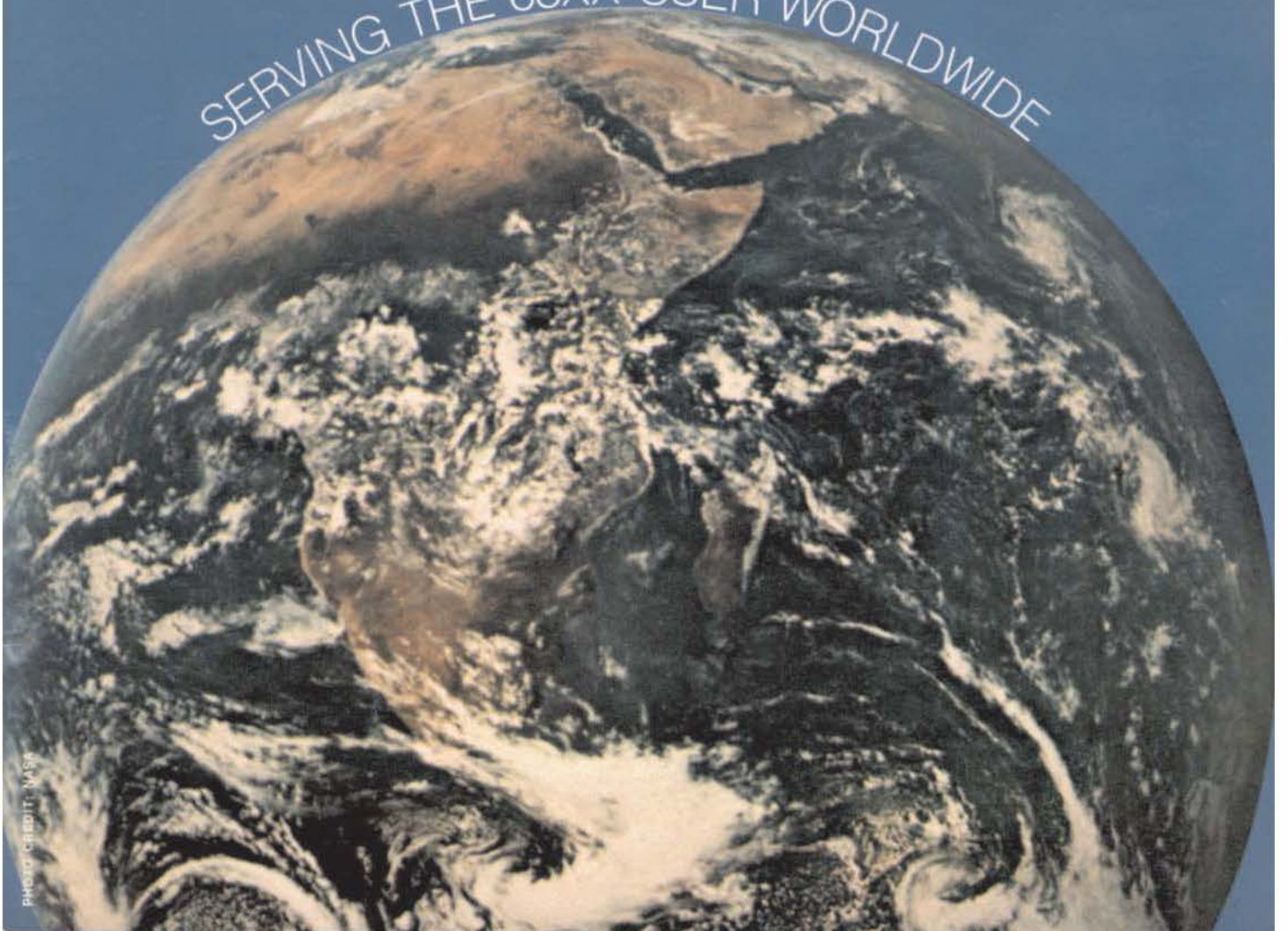


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UniFLEX is the first full capability multi-user operating system available for microprocessors. Designed for the 6809 and 68000, it offers its users a very friendly computing environment. After a user 'logs-in' with his user name and password, any of the system programs may be run at will. One user may run the text editor while another runs BASIC and still another runs the C compiler. Each user operates in his own system environment, unaware of other user activity. The total number of users is only restricted by the resources and efficiency of the hardware in use.



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Support

The design of UniFLEX, with its hierarchical file system and device independent I/O, allows the creation of a variety of complex support programs. There is currently a wide variety of software available and under development. Included in this list is a Text Processing System for word processing functions, BASIC interpreter and precompiler for general programming and educational use, native C and Pascal compilers for more advanced programming, sort/merge for business applications, and a variety of debug packages. The standard system includes a text editor, assembler, and about forty utility programs. UniFLEX for 6809 is sold with a single CPU license and one years maintenance for \$450.00. Additional yearly maintenance is available for \$100.00. OEM licenses are also available.

FLEX™

UniFLEX is offered for the advanced microprocessor systems. FLEX, the industry standard for 6800 and 6809 systems, is offered for smaller, single user systems. A full line of FLEX support software and OEM licenses are also available.



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EDITOR - WORD PROCESSOR
Technical Systems Consultants, Inc.
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Publisher: Don Williams Sr.

Executive Editor: Larry Williams

Subscriptions and Office manager
Mary Robertson

General Girl 'Friday'
Joyce Williams

Contributing Editors:

Dr. Jack Bryant
Dr. Chuck Adams
Dr. Theo Elbert
Dr. Jeffery Brownstein
Dale Puckett
Russell Gore
Ron Anderson
John Jordon

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----- -ITEMS SUBMITTED FOR PUBLICATION-

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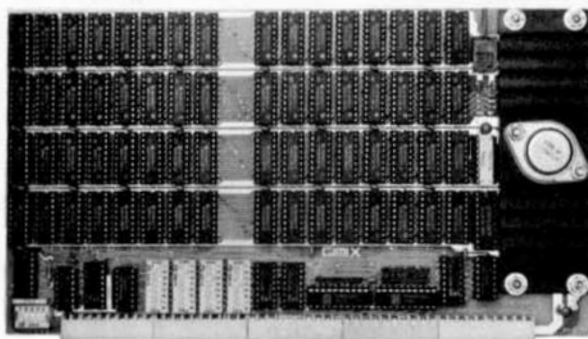
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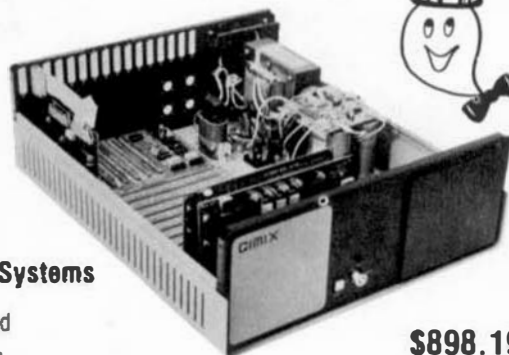
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 - Versatile, easy-to-use input/output supports multiple devices.
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 - Provides log-on password protection and user file security.
 - Can run on small, inexpensive systems with floppy disks and as little as 32K memory.
- ☐ \$495.00*

OS-9™ LEVEL ONE OPERATING SYSTEM

S ingle-user, single-memory map compatible subset of Level Two for software development or stand-alone control applications.

- Versatile input/output system can support multiple devices using interrupt-driven, DMA, or program-controlled data transfer. Users can easily add additional I/O devices.
 - Tape or disk-based versions available.
 - Disk versions support UNIX™-like hierarchical directory structure and byte-addressable random-access files.
 - Memory management for single address-space (up to 64K).
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E xtended BASIC language compiler/interpreter with integrated text editor and debug package. Runs standard BASIC programs or minimally-modified PASCAL programs.

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S tandard Microsoft BASIC optimized for the 6809 and OS-9™.

- Four data types: integer, string, single precision and double precision floating point.
- Program trace and edit capabilities.
- Automatic line numbering and renumbering.
- Supports random and sequential file I/O. Full PRINT USING for formatted output.

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- User-defined macros with parameters permit virtually unlimited command expansion. Macros can be saved, loaded

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- Buffer, line and character oriented commands.
- Search, change and extend operations.
- Permits multiple input/output files.

☐ Disk or tape \$75.00

☐ ROM set (2716) \$90.00

OS-9™ INTERACTIVE ASSEMBLER

Compact Motorola compatible assembler for machine language program development.

- Operates in "batch" mode or interactive line-by-line mode.
- Facilities for generation of OS-9™ memory modules and system calls.
- Formatted listings include syntax and context error checking.

- Runs on OS-9™ Level One or Level Two.

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☐ ROM set (2716) \$90.00

OS-9™ INTERACTIVE DEBUGGER

F acilitates testing and debugging of machine- language programs.

- Includes common "monitor" functions: memory examine/change, breakpoints, display/change registers, hexadecimal arithmetic, etc.

■ Access to system command interpreter.

- Available on ROM, disk or cassette tape.

☐ Disk or tape \$35.00

☐ ROM (2716) \$50.00

BASIC® is a trademark of Motorola. OS-9 is a trademark of Motorola and Microware™. UNIX is a trademark of Bell Telephone Laboratories.

Most software is available on ROM, diskette and tape in versions for many popular 6809 computers. Source listings and yearly maintenance/update service are sold separately for most programs.

*Specify manufacturer and type of CPU and I/O controllers. Contact Microware® for specific availability.



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A/BASIC COMPILER

This BASIC compiler generates pure, fast, efficient 6800 machine language from easy to write BASIC source programs. Uses ultra-fast integer math, extended string functions, boolean operators and real-time operations. Output is ROMable and runs *without any run-time package*. Disk versions have disk I/O statements and require 12K memory and host DOS. Cassette version runs in 8K and requires RT/68 operating system.

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MICROSOFT DISK EXTENDED BASIC FOR OS-9™

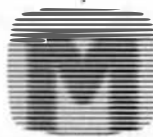
Microsoft Basic is by far the world's most popular Basic language — and a vast library of applications software written for it can be used on your system: business packages, scientific, engineering and educational programs, games, etc. The OS-9™ version of Microsoft Basic is a full implementation of Release 5.0 with the following features:

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- Extensive program editing facilities via EDIT command.
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- Dynamic string space allocation.
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- Protected files can be saved in coded binary format.
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- ☐ Microsoft Extended Basic Release 5.0 for OS-9™ \$250.00
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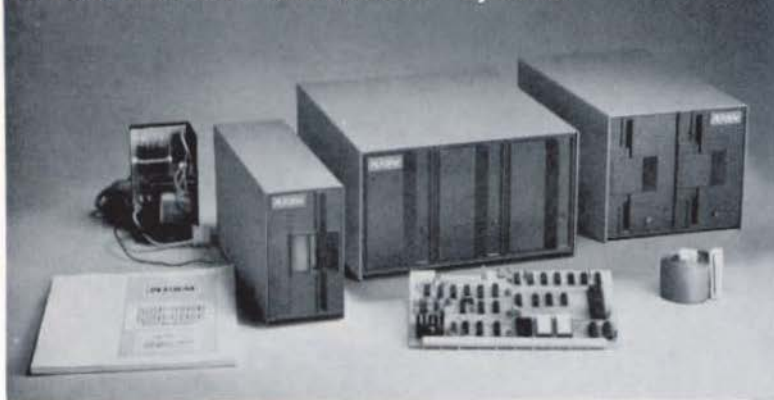
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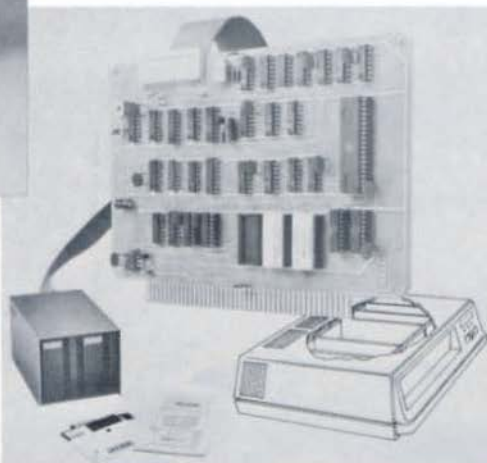
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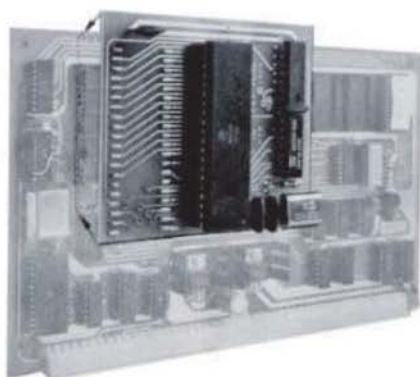
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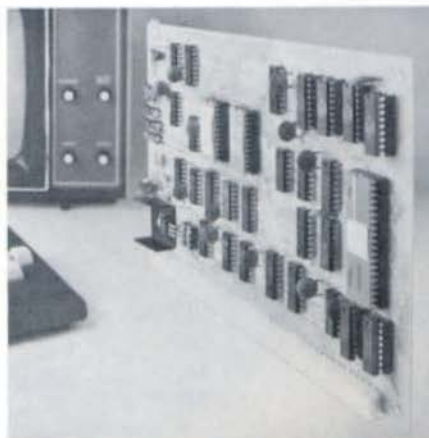
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*Hemenway Associates Software Products for use under FLEX™ are available on the MSI System.

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SOFTWARE ANNOUNCEMENT

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READTEST, a 6800 assembly language program written by 68 Micro Journal Contributing Editor Dale L. Puckett, is such an indispensable application program for all writers, fiction or non-fiction, student or professional. READTEST reads your letters, short stories, news stories, reviews, novels, etc., from the disk file you prepared them on and tells you how well they were written. READTEST is a powerful tool designed to aid both the student writer and keep a running check on the experienced writer. It is a serious application of your 6800 microcomputer that will pay for itself with the first check you receive for a readable manuscript.

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ESTHER identifies proper nouns and uses them in her replies. She also saves them for later use.

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PHILLY SHOW

A grouping of FIFTY BUS exhibitors was organized into one section at the recent Personal Computing show held in late August in Philadelphia. This section was only for 68xx products, and was the largest area in the show. In addition to the exhibit booths there was a combination meeting and lecture area set up in the center. Speakers included Tom Hensen of Computer Consultants of Michiana, Dave Shirk and Den Vanada of TSC, Bob Bundy of Sonex, Ray Talbot of Kenyon, John Alford, Joel Heckman of Universal Data Research, Ken Kaplan of Microware, and Shel and Sam Epstein, with Don Williams serving as ringmaster.

There were 15 separate exhibit booths surrounding the meeting area in a town square type of setup. A synopsis of each booth follows.



Thomes Instrumentation highlighted Mark Sproul's fully automatic answer/originate Modem board. They also showed their new low cost video based 6800 system. Jan Gluyas caught your reporter sneaking Tom 2 butterscotch candy balls. He gave back 4. For those of you who have spoken to Donna on the phone, she's even cuter in person.



Sirius Systems was staffed by Jerry and Leah Robinson who will be having a Forth and a disk controller card for 6809 systems.



CSI's UCSD Pascal was shown by Dave Allen and Kathy Micken.



Universal Data Research demonstrated their Date Base Management System. Joel Heckman has put a lot of time and effort into the development of this, but give Joanne a lot of credit for her support to Joel.



Sonex System's Stylograph caused an editor of a computer period ical, who shall remain unnamed, to exclaim "I didn't know the SS30 had software." He later

explained that he meant good applications software, but admitted that his publication did not cover or solicit software reviews for our bus. He has promised to correct this in the future. This was the first show for Bob Bundy and the first chance for us to meet him in person. He's a quality guy, as is his software.



Kenyon Microsystem's demonstrated their Forth. Ray Talbot was one of the original developers of Forth, and his credentials and background are impressive, but in spite of that he is a real regular person. And a special thanks to Tom Kenyon who hosted a nightly cocktail hour in his hotel room where we could meet and decide where 20 some odd people could feed at one table. The job of Restaurant reviewer has been given to one Don Williams, so look for his column giving tasteful or tasteless suggestions on eating out in Philadelphia.



GIMIX' booth was staffed by Mike Magnus and Richard Don. They showed for the first time their new Disk Controller cards, as well as demonstrating GIMIX' version of TSC's Flex and Microware's OS-9 in use on their 6809 systems. Another GIMIX system was dedicated to showing their 512x512 high resolution graphics, which proved to be a showstopper. The other new GIMIX cards at this show were the 16 socket EPROM/ROM/RAM board capable of storing up to 128K bytes, and their 2 port and 8 port Serial I/O. boards.

The Microware booth was always busy. Ken Kaplan and Larry Crane had a field day demonstrating and teaching users how to use OS-9 and Basic 09. The sales and pending license agreements that resulted from the show had them beaming as they had proven that they have a winner. (note to editor-please identify Larry's photo. In previous story on S.F. Faire he was the unidentified faire goer. At this show he had a badge identifying himself as such) (OUCH! ye ole ed). Ken's



Sunday afternoon symposium in our meeting area drew the largest crowd, we had.



Another first time exhibitor was Star-Kits. Pete Stark of course is no stranger to users on the FIFTY BUS. This was his turn however to be on the other side of the table. Altho he expected the most interest to be in his software, it was his SBC-02 single board computer that stopped the lookers. At this point let me exercise my writer's privilege to digress into Pete's after show hours activities. First, thanks for sharing my double chocolate cake with chocolate ice cream. (note to our wives-we're only kidding) (Ed's note: NO he is not!). Thanks for bringing your friend, Joe Melhado, whose stories and jokes can not be printed, but kept us drunk with laughter into the wee hours. Now if Don will only run that picture of Pete you readers will get a real insight into what Pete Stark is really like (Ed's note; It's here)

The next booth we visit was staffed by Joyce Williams with some help from Don. You should have seen that gal sell old copies of 68 Micro Journal. It seems that once a new subscriber starts, he wants all the back issues. Joyce was there to open up with most of the rest of us bright and early each day. Not so with Don. He kept the rest of us up leading the bull sessions in the Hilton Lobby until early A.M. And then he slept in the morning while Joyce and the rest of us worked pie-eyed. Next year I'm going to hire Joyce away from him and get even. The real hero on Saturday was Ken Kaplan. He and Don were up until 5:30, and Ken was at the booth at 8:30. (Sunday was another matter tho, wasn't it Ken?) Also helping out at the 68 Micro booth was an old friend from past shows who enjoys himself so much that it rubs off on all of us, Joe Sobleski. One of the great enjoyments one gets from participating in these shows



Is the people you meet and get to know. Our Industry is in its youth, and it and the people involved in it have the vitality of youth and I know of no greater example than Joe (Ed's note; agreed 100%).



Hazelwood Computer Systems is another first timer. Dave Bridger showed (and sold the first day all the boards he brought) their new 256x256 graphics card. He and Mike Smith are winners. We have convinced them to go ahead with an IEEE 488 Interface card which we feel is needed for the bus and which is still in the preliminary design stages.

Frank Hogg cut his first set of teeth at this show. They demonstrated and answered questions on various new software written by himself, Pete Murray, Tom Speer, and Dale Puckett, none of who should be



strangers to readers of this journal. By the way, in case Don forgets to give photo credits, they belong to Dale Puckett and Mike Magnus.



The febe group showed the prototype of their FIFTY BUS mainframe with built in keyboard. It looks like a viable product and was well received by the viewers. Watch this journal for announcement of when it will be available. If the production models are equal to the prototype, I predict they will receive a very favorable review.



John Alford is another familiar face who for the first time was on the other side of the table. He received a lot of interest in his CONFORM and SCREDITOR packages. He is also a proud father and rightly so.



We end our tour with HHH. Tom Harmon and Dora Horne demonstrated their SPIRIT language and their ability to put it all together. They had a real nice color graphics demonstration. One of my personal highlights was when I introduced Bob Lentz of Microworks to Tom as Curt from Germany. Bob and Tom had been old friends over the phone, but had never met in person. But when Bob came out with "Vos Is los?", Tom cracked up and knew he was being had. To Dora went the honor of being "Miss NIFTY FIFTY."

A special thanks to John Dilks, the show's promoter, who cooperated in helping us have our own special section. He and Sherry and Dave and Janis Jones arranged for signs, seating, podium, amplifiers, and other amenities that allowed us to create our own convention within the show.



EAT YOUR HEARTS OUT. Don Williams is jealous. Pete Stark gives a victory salute as Richard Don introduces Miss NIFTY FIFTY, Dora Horne.

The show is also people who attend. I personally met with dealers from England, France and Canada as well as the U.S. Universities from Canada and the U.S. were represented. Other industrial users of FIFTY BUS products were in the fields of Aerospace, Nuclear Research, Military, Auto, Tire, Electrical Equipment, Communications, Security Systems to name a few who come to mind as I write this. I dare not list names for fear of leaving someone out.

We, as a group, created the impression among all the visitors to the show that the FIFTY BUS had the most to offer and the most advanced products. Our unified area was not only the largest, but had more variety and



Ken Kaplan of Microware addresses the largest turnout, for speakers. This subject was OS-9 and BASIC09.



Waiting for his turn on the podium is Dan Vanada of TSC. That's Matt Scudleri of Oak Ridge on the right.

more new products, both hardware and software, than any other bus. We generated among ourselves a new esprit-de-corps. At our Thursday night-Friday early morn lobby bull session one of our users was describing the accuracy and tolerances he needs and gets from his 160K 6809 system. The system is being used in the most advanced space age technology. The others present shared our pride and had their eyes opened to the potentials we have in the future. We have come a long way in a short time, but still have a long road ahead. We hope to have this user write an article in the future.

This show proved to exhibitors, visitors, and press what we can do when we present a unified picture. For the exhibitors it was profitable. The users got to see, use and question and learn about the latest in hardware and software in the most convenient manner. To the press and others not on our bus, it was an impressive job of public relations. We shall do it again next year.

Richard Don

Ed's Note: Due to space we will run some of the pictures indicated above in December's issue.

DMW

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Rumors?

The following is gathered from multiple sources and the accuracy cannot be verified for every item referenced. However, there should be more complete announcements to follow in future issues of 68 Micro Journal.

From Southwest Technical Products are some new CRT terminals and additional 5" disk systems. Some of the new 5" systems store more data than earlier 8" systems. Also nearing completion is a new text editor and output formatter (this is done on the formatter (preliminary version)). Uniflex for the SWTPC S09 systems is now being shipped. Also a new version of OS FLEX™ is being shipped by SWTPC and includes a host of new and useful utilities.

GIMIX is now shipping their new 6809 systems and CPU cards. Also in the next month or so they promise to begin shipping their complete line of disk controller cards, both 5 and 8 inch versions. Included is a 'DMA' 8 inch disk controller board, that will work with existing 8 inch disk systems.

We do not, as of this writing, have either the 8 inch version of OS9™ from Microware or Uniflex™ from TSC running. We hope to have them both running by next month and maybe I can let you know a little about each.

Look for a new 6809 computer from the ATARI folks. Look for 32K expansion kits, disks, printer and other products to be advertised soon. I feel that many of our S50 bus vendors should have a field day with this machine. No firm info but the rumors are fairly straight.

Published in this issue is as much technical data as we can scrounge up on the SAM MC6883 Synchronous Address Multiplexer chip produced by Motorola for the new Radio Shack TRS80C color computer, using a 6809E. This chip (6883) is a new device and has little (from reports gathered) field testing. Reports so far is that it runs 'hot' in the TRS80C and could possibly be a source of trouble. Later versions will take care of this problem.

From down Texas way (Digital Research Computers) come information of three new products for the S50 bus. A single board 6809 computer, I/O, 64K RAM (with provisions for extended addressing to 1 Megabyte), color graphics 'DAT' type monitor and other facilities including a video generator built in, rumored price \$795.00. A 64K dynamic board in kit, with sockets, to sell for less than \$300.00, with extended addressing. A 32K static, 2 Mhz, memory system for around \$400.00.

You 68000 buffs need to look into Hemenway's new 68000 O/S. It is reported to be DEC™ type in operation, but faster and with greater utility. Motorola seems to have wrapped up their deal with NCR and IBM for the special 'micro-coded' versions of the 68000.

All you folks over there around Phoenix that heard a loud rumble were not hearing buffalo stampeding; nope, it seems that some heads have 'rolled' because of the condition of the 68000 project. Seems now that there are some bad internal problems, both with the chip and the departments. Where are the support devices - for that matter where is the 'final' version (that works) of the 68000? We have not seen it yet. One thing for sure, when it actually gets here, it should be a winner, when it get here! More as I hear it.

Bear in mind that much of the above is unseen and as stated, rumors. However, I try to confirm as much as I can. Remember it was over a year ago that we told you about the Radio Shack 6809 unit, which is now being delivered. Some other editors and publishers were saying we were 'all wet'. Now we know!

Dixie

DIXIE is a new 'Disk Executive' for the Percom LFD-400 disk system just introduced by Blue Hat Software Company, Box 4127, Flint Mich. 48504. It differs from Percom as well as other 68xx disk operating systems in many ways and provides many new and useful functions. It provides dynamic allocation of disk space, multiple catalogs which are used to group together different files, 12-character file names, file protection facility, and space for 14 catalogs and 45 files. Its author, Larry Preston, is chief systems analyst at a large commercial Honeywell computer installation. It is easy to see that parts of DIXIE reflect his big-system outlook.

The Basics

Most of DIXIE is on a 2708 EPROM which plugs into the middle EPROM socket on the LFD-400 disk controller, replacing Percom's MINIDOS-PLUSX. Percom's MINIDOS EPROM stays on the board and provides the basic disk drivers and utility routines. In addition to the 1K on DIXIE's EPROM, another 1/2K of program sits on the disk, automatically read by DIXIE into its directory buffer area as needed. This part is called the 'transient driver'.

DIXIE requires a standard LFD-400 system with version 1.4 MINIDOS, a MIKBUG-compatible monitor, and about 3/4K of RAM just above the monitor scratchpad at A080. Any system which can run MINIDOS-PLUSX can also be used for DIXIE.

DIXIE is remarkably compatible with the basic Percom disk system and its software. Except for the fact that a DIXIE disk directory is different from a MINIDOS-PLUSX directory, each DOS can read the other's files. Thus disk conversion is not very difficult and a certain degree of compatibility exists as long as you have a printout of the disk contents. But the two operating systems cannot write on each other's disks.

(DIXIE even fits into disk systems which have Star-Kits' P-DOS Patch ROM, which adds read-after-write error detection and correction to the Percom system. With Percom's MINIDOS in ROM socket 1 of the controller, DIXIE in socket 2, and P-DOS in socket 3, the system just purrs along with all three ROMs working together although they came from different suppliers.)

Disk Organization

Percom's MINIDOS-PLUSX uses the first two sectors of track 0 for a directory, and leaves the other eight sectors blank (file storage starts at sector 0 of track 1). DIXIE, on the other hand, makes use of all ten sectors of track 0.

Before a disk can be used under DIXIE, it must be initialized with the INITDISK utility. This utility initializes track 0 of the disk in DIXIE's special way. Thus the disk contains part of DIXIE and a variety of additional information, yet has the same storage capacity as a disk formatted by an unmodified MINIDOS-PLUSX.

Initializing a disk writes the following information on track 0: Two sectors hold the DIXIE transient driver. This 1/2K program segment loads over the directory area as needed to expand the length of DIXIE yet conserve on ROM space.

Two sectors contain a sector map and disk label. The sector map contains either 350 or 400 bytes (depending on whether a 35- or 40-track drive is used), where each byte corresponds to one sector of the

disk. If a given byte has a 0, that means the corresponding sector is empty. A non-zero number signifies that the sector holds part of a file, and the number in the byte is the number of the file (which is keyed to the file number in the directory).

Here is a major difference between disks written under MINIDOS-PLUS and DIXIE. MINIDOS-PLUS disk files always occupy a group of consecutive sectors. Although MINIDOS maintains forward and backward pointers on each sector so that theoretically files do not have to be in consecutive sectors, in practice MINIDOS-PLUS will always place them that way. Moreover, when a file is deleted, the released sectors are added to the free space only if the file was the last on the disk. Otherwise the released sectors are left blank.

In DIXIE, however, released sectors are marked with a 0 in the sector map, and the very next SAVE command can re-use them even if they are in the middle of the disk. Moreover, a file can be split up into non-consecutive sectors if it does not fit into a single available space. DIXIE simply searches the sector map sequentially for empty sectors, saves the file into them, and lets the standard MINIDOS backward and forward pointers tie the sectors together into a chain.

Thus DIXIE provides the same dynamic allocation scheme as Flex, SSB DOS, and other advanced systems do, but in a different way. In all of these, files can be spread out over many non-contiguous sectors on the disk. In all of these, the directory points to the first sector of each existing file, while each sector points in turn to the next sector in the chain. The last sector has a pointer of 0, which signals the end of the chain. When a file is read sequentially, the DOS follows the pointers to the end.

The difference between DIXIE and other 6800 disk operating systems is in its handling of the empty sectors. MiniFlex, Flex, and SSB DOS treat the empty sectors as just another file which happens to consist of garbage. The directory points to its first sector, and each sector points to the next empty one. When a file is deleted, its sectors simply get added at the end of the string. After many deletions and additions, the chain of empty sectors can wander back and forth over the disk. When a new file is written, the disk head may have to go in and out many times to follow the chain.

In DIXIE, on the other hand, there is no chain of empty sectors. Instead, empty sectors are flagged in the sector map with a 0. When a file is deleted, its sectors are flagged with a 0 and simply added to other adjacent empty sectors. Then, when a new file is written, DIXIE starts grabbing unused sectors, starting at the outside tracks and going in. Thus reading or writing a long file is inherently faster, since the amount of head seeks is minimized.

Similar time savings exist in other operations. For example, when Flex deletes a file, it must step the head to inner tracks of the disk in order to update pointers. DIXIE, on the other hand, just changes the sector map and rewrites it.

Since the sector map uses just part of two sectors, DIXIE also stores a disk label into the same area. Whenever a disk is initialized, the disk is given a number and name; each time a drive is accessed, DIXIE prints out this information to confirm that the correct disk was mounted.

The remaining six sectors of track 0 hold the actual directory information. There is a main directory and up to 14 lower-level catalogs. Whenever a file is saved on a disk, it is either assigned to one of the 14 catalogs, or uncatalogued. The disk contains a one-sector catalog directory which lists the names of all the

catalogs, and a five-sector file directory which holds the names of all files, their file number (which is keyed to the sector map) and their catalog number (which is keyed to the catalog descriptors, and indicates which catalog holds that file). A file assigned catalog number 0 is assumed to be uncatalogued.

When DIXIE's F (Files) command is used, the directory printout provides the listing of all catalog names, as well as a listing of uncatalogued files. When the F is followed by a catalog name, then only the files belonging to that catalog are listed. Hence a disk directory listing can contain just selected classes of files.

This is a concept which is borrowed from much larger systems which may use multi-megabyte hard disks. The idea is that all Basic programs can be assigned to one catalog, all assembly language source programs to another, object codes to a third, and so on. Utilities which are commonly used would be uncatalogued and accessible outside each catalog. (The next extension would be to assign access codes so that each user could have access only to specific catalogs, but all users could access uncatalogued files.) In this way a directory printout would contain only files of interest, rather than all the (possibly hundreds) of files that a hard disk can hold.

While elegant, this idea has limited use with single-density, single-sided mini-diskettes. Since such diskettes have limited storage, are easily interchanged, and are even quite cheap, most disk users have long ago learned to devote different disks to different types of files. But if DIXIE ever gets adapted to a hard disk...

DIXIE Commands and Utilities

DIXIE has the following commands: C - Create a file. Puts the file name into the main directory or into one of the catalogs, but does not assign any disk space.

D - Create a catalog. Assigns the catalog name, but leaves it empty.

F - Files. Prints a disk directory or directory of a catalog. The directory contains the catalog or file name, file number, file size and file type, beginning, ending and transfer addresses, and first disk sector.

J - Jump to a memory address.

L - Load a file but do not run. A file is generally loaded into the same area it came from, but can be loaded into a different location.

N - Rename a file.

O - Rename a catalog.

P - Protect or un-protect a file.

A protected file can be read or renamed, but not deleted or rewritten.

Q - Query a disk. Prints out disk name and number, and number of free sectors.

R - Delete a file and release its name.

T - Delete a catalog and all its files (unless protected).

S - Save contents of memory (and a transfer address) to a disk file.

Whenever a file is saved whose name already exists on the disk, the prior file is removed (unless protected) and the new file substituted (even if it is larger or smaller; only as much space as is needed is allocated.) Note that the file must be created with the C command before it can be written to, a minor inconvenience which takes a bit of getting used to.

When any other entry is typed, DIXIE searches the disk for a file by the same name and executes it if present. Thus user programs, or disk-resident utilities are executed by typing their name.

(A complete file description consists of #drive-number /catalog-name file-name, where the #drive-number can be omitted for drive 1,

and the /catalog-name is omitted for uncatalogued files. The catalog-name and file-name can be up to 12 characters long and contain letters, numbers, and most punctuation symbols.)

The DIXIE EPROM comes with three disks which contain source and object code for DIXIE itself, for several disk - resident utilities, and for patches to other programs. The disk - resident utilities include INITDISK for initializing a disk, NEWLABEL for changing a disk label, SINGLECOPY and DUALCOPY for copying entire disks using one- or two-drive

systems, FILECOPY for copying single files, and PDIXD for printing a formatted disk directory on the terminal or a printer.

Program Patching

Since DIXIE files are dynamically allocated space as needed on a disk, with consecutive sectors linked via the MINIDOS forward and backward pointers, they can be read by either MINIDOS or MINIDOS-PLUSX (assuming that the starting sector of a file is known.) But they cannot be written that way since neither MINIDOS nor MINIDOS-PLUSX has any way of knowing how many sectors are free, or whether a given sector is assigned to a file or not. Hence any Percom program that writes on the disk must be patched to use named files via DIXIE.

Supplied with DIXIE are patches for Percom's HEXLDR, Assembler, and Touchup editor, as well as for the cassette versions of the TSC Editor and TSC Assembler, and for SWTP cassette Basic version 2.0 and 2.2; the latter allows program storage but not disk files. (An essential patch for Percom Super Basic is in the works and should hopefully be available soon.)

When this is done, these programs prompt for a file name (preceded by drive number and/or catalog name, if applicable), and then print out the disk label to make sure the correct disk is used. If desired, the standard DSSS Percom format can also be used for input files, so that files can be read from unformatted disks, or from MINIDOS-PLUSX - formatted disks.

Some Percom programs, such as the text processor, or DSKMAP, will work without patching since they only read files using the DSSS format. Since the DIXIE directory printout gives the starting sector for all files, this information can be given to these programs.

Those Percom programs (or programs patched by Percom) which write on a disk but use only DSSS format can still be used, but only via MINIDOS itself, not DIXIE. This might include A/BASIC or a disassembler, for instance. A user would have to be careful to use un-formatted disks (not DIXIE formatted disks), and could then transfer resulting files to a DIXIE disk with the FILECOPY utility. This process is inconvenient, but at least tolerable if it is not done too often.

Overall Conclusions

DIXIE is quite reasonably priced at \$60 for the 2708 EPROM, three disks of code and patches, and a quite comprehensive user's manual. The manual contains complete instructions for using DIXIE and applying the supplied patches to existing software, as well as a good description of how DIXIE works. Since all source code is supplied on diskette, it should be easy to study or modify the system if desired.

The only question each user has to answer for himself is whether the conversion from MINIDOS-PLUSX to DIXIE will justify the time expended in translating disks and learning a new system. (Larry Preston plans to produce a utility to convert MINIDOS-PLUSX disks

to DIXIE format, but it is not available at this time.)

With the exception of Percom Super Basic, other Percom programs running under MINIDOS-PLUSX use the DSSS format rather than named files. This means that a slip of the finger, or a slight mis-calculation, can store one file on top of another.

DIXIE to a large extent eliminates that possibility - at least for those programs which are patched to run under DIXIE. With DIXIE's dynamic allocation of disk space, one named file should never overwrite another. On the other hand, unpatched programs which still use the DSSS format require extra special care now, since DIXIE files can be spread out over many sectors and tracks, in places where you'd least expect them.

For many years, proponents of other disk operating have looked down at the Percom disk system and called it a fast cassette system rather than a real disk. They

should look at DIXIE, for it gives them most of the features they have always been missing, and does so at a fair price..

XREF

Not part of DIXIE, but also available from Blue Hat Software is XREF, a patch to the Percom Assembler to produce a label cross-reference printout at the end of assembly. XREF is enabled by the OPT XRF statement (which is selected by default), and disabled by OPT NOX. When enabled, the assembler assigns a line number to each line of program, and at the end prints a listing which shows for each reference label (a) the line in which it is defined, and (b) all the lines in which it is used. At \$15 for a disk which contains source and object code for the patch as well as a manual, XREF is a valuable addition for the heavy assembly language programmer.

CONTEST Notes

SOME NOTES ON SOFTWARE CONTEST

The following was attached to one of the contest entries. "This program hasn't been previously published in any commercial magazine or journal and is the "soul" property of xxxxxxxxxxxxxxxxxxxxxxxx". Note: the (B's) are added. Such were the feelings of one contest entrant. No doubt most all who entered had some feeling about his or her entry. After looking over a majority of the entries I must admit that I can fully understand the above.

When it all started, nearly a year past, I just did not know what to expect. A good thing, if I had known, I probably would have had second thoughts. Now however that it is 'nearly' finished, I feel a lot better about the contest and the interest it generated. Not all categories were sufficiently filled with winners (or entries) for all the prizes. A couple had an overflow of entries. Also some interesting percentage figures emerged as a result of the number of entries, per category. All in all it was enlightening and gave me a good overview of what we should do, in case we ever try another contest.

One thing became apparent, especially as things begin to drag a bit. First, I began to realize (should have known from the many buckets of sweat I have shed on some programming project) that, in many if not most cases, the 'special' beauty of a program is in the eyes of its creator. As the local judges (we used 6 local 68XX users to judge portions of the entries) came together, after reviewing their respective

charges, each with some decisions made, it became apparent that not everyone views the merits of a particular program to the same degree. In fact it was difficult, at first, to believe that we would ever get it finished. We even nit-picked some. I stayed out of all final decisions. If I felt that some particular program was lightly or heavily dealt with, I would gather another committee, of the judges present, or occasionally had to get on the phone to some that were not present, and have them give a second opinion. Sort of like a medical conference. We would take their opinions back to the rest of the group, again sometimes by phone, and finally each entry fell into its place of judgement. I can tell you this, none of us agreed that the final results were as we would have personally preferred, however, I honestly believe that the decisions were as fair as any committee could arrive at. Such is the penalty of group action; honest, fair but cumbersome.

Anyway we have all the local judging finished and are waiting for two categories, being judged in different parts of the country, to be returned. This means that I can get it finally wrapped up (?). The thing that I hope does not occur is that any one gets his or her feelings hurt. I am sure that some who ended up in one position could have well been in another (better or worse) position, had other judges evaluated their offering. I have even received phone calls and letters from friends of some who entered, extolling the virtues of a particular entry, their friend's. For this reason, as well as others, I had no hand in any FINAL decision. When the final results are published, hopefully next month, the die will be cast. No appeals or reviews, right or wrong, the judges decisions will stand!

More will be expounded upon next month (?), but for now I just want to heartfully thank all who entered and all who supported this effort by their donations. I honestly believe that we are all a little closer as a result of those involved.

As for the prizes, excluding those from 68 Micro Journal (subscription winners to be notified from here), letters will be mailed to all donors requesting that they forward their particular prize on to the winner. Also the occasional use in this column of the character (?) is mainly due to the feeling I had, at the beginning, that we could get it finished in 4 or 5 months. Oh well, what was it some one said about 'the best laid plans of mice and (?)'.

FLEX User Notes

BY: RONALD W. ANDERSON
3540 STRUBBRIDGE COURT
ANN ARBOR, MI 48105

One of the most prolific of the suppliers for 6800/6809 software is Technical Systems Consultants of West Lafayette Indiana. One of their newer offerings is their Flex Diagnostics Package for 6809. This package includes a series of memory test programs and a group of programs for checking, diagnosing and repairing disks that have "crashed". The manual that comes with the programs is 100 pages long. Though TSC has always produced a better than average manual, their trend is to better and better documentation. This time they have done extremely well. The manual is much more than instructions for the use of the diagnostic programs. It contains long discussions of memory organization and of the types of failures that may be encountered. It points out that dynamic memory has different modes of failure than static memory, which is the reason for the inclusion in the package of a dynamic memory test.

The diagnostics are roughly divided into two equal groups. The first is the memory test group.

It is pointed out in the manual that different modes of failure are detectable by different test methods, and the manual recommends the order in which to try the test programs to try to find a bad memory chip. The tests are listed here with a description extracted from the TSC information.

CONVERGE - used to detect address or data lines that are shorted together.

DYNAMIC - for testing of dynamic memory of course.

QUICK - a check that reveals "solid" failures. It runs very fast.

RANDOM - a slower test that shows up more subtle failures. Essentially test of memory with changing random pattern.

WALKO - test in which only one bit in the memory being tested is a 0.

WALK1 - inverse test of WALKO.

Each of these tests takes longer than the previous one in the list. Some of you may have the TSC diagnostics package that is compatible with the AC-30 cassette system. These tests are similar in result, but they are completely new in terms of operating with the disk system, messages that they present, and in the ease of escape from the tests back to FLEX. All of the tests recognize when FLEX has been overwritten, and warn you of the fact, then exit to the monitor when they are finished.

The other half of the diagnostics as I said above, is the Disk Diagnostic Package. Here again, TSC has provided a short textbook on how a FLEX disk is organized, and what some of the failure modes are. There are 10 programs for diagnosing and solving disk problems in the package. TEST is a fast program that checks for bad spots on the disk. FILETEST does the same thing but indicates in which files the bad spots are located. VALIDATE looks for discrepancies between the file and the information in the directory, intersecting files, etc.

Four of the programs are used to recover data from damaged disks. TSC does stress the fact that a good backup is the best way to recover from a disk failure, but the utilities given here allow for the recovery of a single file, or a try to reconstruct all the files on a disk, even if the directory is "wiped out". REBUILD and RECOVER are for the recovery of files from such a disk. REBUILD will attempt to save all the files from such a disk, while RECOVER allows specification of which file to save, however, requiring that you specify the starting track and sector of the file. RAWCOPY will copy a file with a checksum error, to a new file. This would be of most use in recovering a text file. The damaged area will still be damaged, but the text editor may be used to repair this area if it is not extensive. UNDELETE does just what it says. When a file is deleted, the sectors that it occupied go back into the free chain at the end. Therefore, the most recently deleted file becomes the last area to be written over. There is therefore a reasonable chance that the last few files deleted are still intact, particularly if the disk is not too full. This utility will indicate all the intact but deleted files and allow you to "dump" them to the terminal in an effort to determine which is the one of interest. You may then recover any of them, specifying a filename for the "undeleted" file. I know of one case where a few hours of typing could have been saved with such a command. An operator was using the text editor and processor, and had been working for some time on a file when the power failed. When power was restored, the operator tried to edit the backup file but mistakenly didn't rename the file from .BAK to .TXT. When the editor asked "DELETE THE BACKUP FILE", the operator responded with a Y, and deleted the backup. The new file was not written when the power failed and the file was lost. Not only did the last edit session have to be redone, but a whole large file had to be retyped. UNDELETE would have allowed recovery of the backup at least, and only the last edit would have been lost.

COPYR is a special utility used to rebuild a sector map for a random file that has been recovered. FLAW is used to remove an

"Intermittent" sector from the sector map of the disk so that the remainder of the disk may be used. EXAMINE is in a class by itself. The Flex Newsletter 2 from TSC had a "Dump and Repair" utility. My newsletter had a FILEPAT utility. This one is a combination of the two and about 4 more. It allows you to look at any sector on the disk, and make byte by byte changes. It does this by reading the sector to the sector buffer in the FCB, and allowing you to edit the information there with a function like the memory examine and change function in SWTBUG and SBUG-E. No changes are made to the disk until you have had a chance to make the desired changes and dump the sector to the screen again to see if all is correct. You may then write the sector back to the disk or abort the change. There are many ways of moving from sector to sector on the disk. The user is fully prompted for the required input, and like all the other utilities of this package, there are numerous messages generated by this utility.

Those of you who have read my reviews before in other publications and my newsletter, know that I am not always totally complimentary of software that I review. I would have to try very hard to find something to complain about. Perhaps it could be said that the price for the package seems kind of steep for the number of sectors of program on the disk. On the other hand, someone said that good things come in small packages. If you can recover a disk file or find a memory problem and get your system back running with this set of utilities, perhaps you will save the cost of them the first time you have to use the package! We all know that we should keep backups of our disks, but how many of us back up our system disk every time we add a utility or make an improvement in, say our startup file? I find out how sloppy I have been when I lose a file and the backup has 40 sectors less than the disk it is backing up! I can't give this one less than an AAA rating, both for the documentation and the programs.

MORE ON PRINTER MODES

In an earlier issue, I published the "U" utility group. In the discussion of its uses, I mentioned the H sub-utility being used to output control characters to the printer. This month, you will note the listing of the SET utility. While this is written expressly for the Paper Tiger, I am sure that any of you with a little Assembler programming experience could use it as a model for another set of control characters. As in the U utility last time, I've used a set of single letter commands that follow the filename SET on the command line, to provide for setting the various modes of the printer. I've tried to use letters that could represent the various modes, such as X for extra wide, S for Skinny, etc. There is also a C for Clear, that returns the printer to its normal status. This utility assumes that you have previously loaded PRINT.SYS either by having used a command with a P, preceding it, or by using GET PRINT.SYS. It checks to see that PRINT.SYS is loaded and issues an error message if not. This means that you don't have to use P before SET. SET.W will set the printer to 10 characters per inch. Note that these work in a TSC BASIC program also, using the EXEC command. This means that you can change your printer mode under program control in a BASIC program.

Incidentally, there is one sure way to have previously loaded PRINT.SYS when you use the SET utility. Your STARTUP.TXT file could contain the line GET PRINT.SYS.0. Whatever combination of features your printer has, you may make them available to you at the DOS level, and to all your TSC BASIC programs. You will notice that the same technique was used here as in last month's U utility for finding the proper entry point in the program from the command letter. The letter is compared to the first of each three byte group in the JTAB at the end of the program. If and when a match is found, the starting address for that segment of the program is found in the next two bytes, by a LOX 1,X instruction, and then executed with a JMP 0,X. Several bytes of program were saved by using a common output character routine at the label OUT. All of the set commands branch to this point after loading the A Accumulator with the proper control character. Here, there is a JSR POUT, to the print output routine, and a JMP WARMS to get back to FLEX.

You will note that I have used a FLEX2 equate file for the equates. Simply by using a FLEX9 equate file, this program could be assembled with the 6809 Assembler, and would run in the '09 system as well. As I am writing this, it occurs to me that this is the only necessary change to get FLEX2 utilities to run in 6809. Of course, the '09 utilities ORG at \$C100 and the FLEX2 utilities at \$A100 so that the ORG would have to be changed. TSC supplied manual on the Assembler describes the Library feature, as did this column last month. The library file does not, in fact must not have an END at its end, or the Assembler will stop assembling at the end of the library file. The library file must contain just the lines that you would normally want inserted at the point where the LIB instruction is inserted in the program.

I thought it might be informative and educational to present the SET program here in Pascal and BASIC. First of all, it does not make sense to write the program in a BASIC interpreter, because then you'd have to load BASIC just to set the printer mode. Some of you have Microware's A/BASIC compiler, and for those of you who don't, it is a subset of BASIC, and the exercise might be informative. The largest limitation to A/BASIC is (at least for present purposes) that it does not allow a statement after an IF - THEN. You may only go to another line or to a subroutine. I have written two programs to show some alternative ways of using BASIC. The problem to be solved with this program is one that may be generalized to a type called an N way branch. We want to examine an input to see if it is one of several possible values, and take a different action for each possibility, including reporting an error if it is not one of the valid inputs.

The program SETBAS uses a peek and poke to control the output such that the prompt for the command goes to the terminal, but the output of the control character is to the printer. You must use the P, preceding this program, ie. P,SETBAS. The program prompts for the command letter, outputs it to the printer and returns to FLEX. The letter input in response to the prompt is simply tested in turn for each of the valid values, and a jump is made to the proper output response line when a match is found. If no match is found, an error message is printed and the prompt is output again.

SETBAS1 is an alternative way of doing this comparison. It uses the "if not then skip" approach. The result is a little cleaner, but not any easier to follow. What is needed here is a way of making a multiple choice. There is the ON GOTO statement in BASIC, but that only works on consecutive numbers starting at 1. We could use a series of statements in A/BASIC, that would assign a value to a variable Q, such as (rather than line 51 being PRINT CHR\$(28)), let line 51 be Q=1, etc. for the other values of M\$. Then, you could ON Q GOSUB 60, 61, 62, 63, 64, 65, 66, 67. These lines could print the various control characters. This arrangement, while a little more structured, would mostly serve to make the program a little longer. Of course, in a BASIC that allows statements after an IF - THEN, you could simply use 7 lines such as IF M\$="X" THEN PRINT CHR\$(28). This would be a bit simpler because the number of GOTO's would be greatly reduced.

Pascal has a simpler solution, or at least one that is more structured. The Pascal CASE construct is just like the ON GOTO, in that it is our N way branch. Pascal, however, allows integers, characters, or T PE variables in the CASE statement. Without getting into the subject of enumerated, scalar, or TYPE variables in Pascal, the character variable use here will work fine. It is also possible in Pascal to define constants with names just like variable names in BASIC. The names or identifiers as they are called in Pascal, may be long, but only the first 6 characters are used by the program. (This is a limitation of Lucidata's implementation of Pascal, and not necessarily true of all implementations). By assigning values to names, the program makes more sense when we try to read it. This Pascal also allows hexadecimal constants. They are identified as in the Assembler, with a dollar sign. It makes more sense to write POKE (SWITCH, ON), than to write POKE (-21470, -1), though they are equivalent.

You will note that the control characters have been defined too. WRITE is equivalent to PRINT in BASIC, and READ is equivalent to INPUT. The CASE statement is almost self explanatory. Which ever "label" matches the input character, its corresponding statement immediately to its right, is executed. All CONSTANTS and VARIABLES must be declared at the start of the program, and their types given. An attempt to use a variable of the wrong type, eg. to add a character to a number, will result in an error when the program is compiled. All the Variable declarations may look like a pain when you start using Pascal, but you will soon find that they allow the compiler to catch many of the "dumbs" that we all build into a program. By the time your program has made it through the compiler with no errors, it will be pretty close to running properly, though not necessarily error free.

THE 68000 PROCESSOR

Please consider this to be my personal opinion. I will be glad to receive contrary opinions from readers. Today, I attended a Motorola Seminar on the 6809 and 68000. The emphasis was on the 68000. Motorola has a great deal at stake in this development. They now have an EXORciser development system for the 68000, though there are still available a number of cross assemblers and compilers to run on other computers, including the Exorciser 6800 system. The 68000 is a 16 bit processor with 32 bit capabilities just as the 6809 is an 8 bit processor with 16 bit capabilities. Motorola has extensive plans for a line of "Micromodule" cards for the 68000, though they are 14 1/2 inches by 9 1/2, so they don't look very "micro". Incredibly (to me) they are still not providing any high level software with floating point arithmetic capabilities. It is certainly because of the applications in which I am involved, but I can't see why anyone would need a processor as powerful as the 68000 if they were not doing calculations of some magnitude. They are planning a version of Pascal with REAL (floating point) variables if they see a demand. (Interestingly only about 5% of those attending indicated a need for it). Motorola has a PL/M for the 6800 and 6809, and will extend it to the 68000 also, but it has only integer arithmetic too. They do have a very powerful assembler in the mill for the 68000 with (strangely) a few of the higher level constructs such as DO WHILE, REPEAT UNTIL, IF THEN, etc. These will take care of loop construction in the assembler, and make the loop exit condition tests work correctly for the programmer. They admit that this is somewhat a reversal of the normal philosophy, but it sounds like it may be a very good feature.

All the software that is planned for the 68000 is planned in a 6809 version too, so there will be a great deal of support for the '09. In addition to the software support, there will be a lot of new peripheral chips for use in larger systems. There is a memory management chip, a combination PIA - timer, DMA controllers, etc. The 68000 has many features that were put there to make it easy to implement higher level languages. There is in addition to a 16 bit multiply, a divide instruction. In fact, there are signed and unsigned multiply and divide instructions. Instructions work at the bit, byte, word (16 bit) and double word (32 bit) level. A friend who works with an LSI-11 indicates that the two are very similar in capabilities and instruction sets. It will probably be one to two years before any of this filters down to the hobbyist level. Some of the chips and software are a year away as of this writing (May). The 68000 sold for \$250 a few months ago, but the current price is \$180. What "scares" me is all the hardware support required. The 68000 can address 16 Megabytes directly with its 24 bit address bus. The data bus is 16 bits, but N by 8 memory can be accommodated, and is planned for at this point.

I guess, to sum up my impressions, very few of the people at the seminar, and I have no idea how many are currently 6800/6809 users, are using the current devices to a small fraction of their capabilities. Perhaps there were many present who don't now use Micros. It would seem to me that more would be accomplished by using the 8 bit micros capabilities, and pushing these a little before jumping into twice the hardware, four times the complexity, and who knows how many times the cost, to do the same job. With 16 Megabytes of

addressable memory, who will bother to write efficient compilers? The end of all this will be tremendously complex systems that no end user will be able to understand or maintain. The large increase in hardware will result in a large decrease in reliability at the same time. Don't get me wrong, I think there are good applications for 16 bit machines, and even the 32 bit processor that Motorola is undoubtedly working on, but these are not the same applications for which the 8 bit machines are ideal. Motorola should be aiming the larger processors at the market in which they are necessary to do the job. For example, complex NC machine controls, not those in which each move is programmed by a punched tape, but those into which the part parameters are programmed and the motions are calculated in real time. Here speed is important. Some of the present machines are rate limited by the calculation time. How about Business applications? If Radio Shack can sell a TRS-80 system for a small business, and they do seem to be doing so with some good results, how about a 68000 system for a medium sized business? How about a time sharing system for, say, a college Chemistry Department? One of these systems would be ideal for a medium sized Engineering Department for design work. All these applications imply the availability of fully implemented or nearly fully implemented versions of the common programming languages.

Now that I've climbed on my soapbox for this time, I'll get off, and see what kind of response I get. See you all next time.

A final note, apparently Lucidata Pascal does not use the normal FLEX routines PUTCHR and GETCHR for its I/O, and the SET program in Pascal, though it does set the printer mode properly, does not switch the prompts to the terminal as planned. Pascal has an overlay to tie in a printer, which I have not yet implemented. The program serves as a better example as is, since it implements the same functions as the one in A/BASIC and the assembler version.

MODEM INPUT AS A DISK TEXT FILE 4-16-80 15C ASSEMBLER PAGE 1

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5      *
6      *
7      * TERMCN OPENS A DISK FILE SPECIFIED IN THE COMMAND LINE AND
8      * INPUTS ALL INPUT FROM THE MODEM (INCLUDING THE ECHO OF YOUR
9      * COMMANDS INPUT FROM YOUR TERMINAL) TO MEMORY. WHEN YOU TYPE
10     * AN ESCAPE CHARACTER, THE DATA IS SAVED TO THE DISK FILE.
11     *
12     * TERMCN COMES UP IN THE NO-ECHO MODE. IF YOU WANT TO SWITCH
13     * THE ECHO MODE TYPE CONTROL E TO TOGGLE ECHO ON AND OFF.
14     *
15     * EXAMPLE:  TERMCN,TEST
16
17     * THIS WILL OPEN A FILE TEST.TXT ON THE WORKING DRIVE AND SAVE
18     * THE COMMUNICATION TO IT.
19     *
20
21     * EQUATES
22
23 0000    BEGMEH EQU 0000
24 7FFF    ENDMEN EQU 7FFF    ALTER THIS TO REFLECT YOUR SYSTEM MEMORY END
25
26 0000    PORT0 EQU 0000
27 0004    PORT1 EQU 0004
28
29 A840    PCB EQU A840
30 A80C    PORECH EQU A80C
31 A803    WARRMS EQU A803
32 A815    GETCAR EQU A815
33 A81E    PRTRNC EQU A81E
34 A824    PERLF EQU A824
35 A82D    GETFIL EQU A82D
36 A833    SETEXT EQU A833
37 A83F    OPTERR EQU A83F
38
39 0403    FASCLS EQU 0403
40 0406    FMS EQU 0406
41
42 A100    DPC 04100    FLEX UTILITY SPACE
43
44 A100 20 05    TERM DMA 10002
45 A102 01    WH FCB 1
46 0103    BECASH RMB 2
47 0105    ENDASH RMB 2
48
49 A107 CE A8 40 20    TERM2 LDX 0FCB
50 A10A B9 40 20    JSM GETFIL
51 A10D 24 07    BCC 10003
52 A10F B6 15    LDA A 021
53 A111 47 01    STA A 10X
54 A113 7E 01 FF    JMP ERROR
55
56 0114 CE A8 40 20    TERM3 LDX 0FCB

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57 A119 B4 01      LBA A 01
58 A119 B0 A0 33  JSR SETEXT TO .1K1
59
60 A11E CE A0 40  OPEN LDX 0FCB
61 A121 B4 02      LBA A 02
62 A123 A7 00      STA A 0:2
63 A125 B0 34 04  JSR FMS
64 A128 27 03      DEQ AC10H1
65 A12A 7E A1 F9  JMP FILERR
66
67 A12D CE 00 00  ACT101 LDX 0P0H10
68 A130 B4 03      LBA A 03
69 A132 CA 15      LBA B 0A15
70 A134 A7 00      STA A 0:4
71 A136 77 00      STA B 0:2
72 A138 A6 01      LBA A 1:1
73
74 A13A FE A2 09  LDX 0VSC4
75 A13D B0 A0 1E  JSR PSTPUG
76 A140 B0 A0 C4  JSR PCRLF
77 A143 CE 00 00  LDX 0MECEN
78 A146 FF A1 03  STX NEGADR
79 A149 FF A1 05  STX ENHADR
80 A14C 7F A0 0C  CLR PDRECH
81 A14F 73 A0 0C  TERDEC CON PDRECH INITIALIZE OFF
82
83
84
85 A152 CE 00 00  TSTADR LDX 0P0H10
86 A155 F4 00      LBA B 0:1
87 A157 54
88 A158 24 1D      DEQ 1STDR
89
90 A15A 48 A1      LBA A 1:1
91 A15C B4 7E      AND A 0:7F
92 A15E CE 00 04  JSR 0P0H10
93 A161 B0 A1 0E  JSR OUTCHR
94 A164 B0 A1 47  JSR MEMORY
95 A167 24 03      DEQ 0H01
96 A169 7E A1 0F  JMP MEMOV
97 A16C 7D A0 0C  PDRECH
98 A16F 24 04      DEQ 1STDR
99 A171 CE 00 00  LDX 0P0H10
100 A174 B0 A1 4E  JSR OUTCHR
101
102 A177 CE 00 04  TSTDR LDX 0P0H10
103 A17A F4 00      LBA B 0:1
104 A17C 54
105 A17D 24 03      DEQ 1STDR
106
107 A17F A6 01      LBA A 1:1
108 A181 B4 7F      AND A 0:7F
109 A183 B1 19      CMP A 0:10
110 A185 27 3F      DEQ EXIT
111
112 A187 B1 05      CMP A 05
113 A189 27 04      DEQ TERDEC
114
115 A18D CE 00 00  LDX 0P0H10
116 A18E B0 A1 0E  JSR OUTCHR
117 A191 70 00 0C  TST PDRECH
118 A194 24 0C      DEQ 1STDR
119
120 A196 CE 00 04  LDX 0P0H10
121 A199 B0 A1 0E  JSR OUTCHR
122 A19C 20 04      DRA 1STDR
123
124
125
126 A19E E6 00  OUTCHR LBA B 0:1
127 A1A0 54
128 A1A1 54
129 A1A2 24 FA      DEQ OUTCHR
130 A1A4 A7 01      STA A 1:1
131 A1A6 39
132
133 A1A7 FE A1 05  MEMORY LDX ENHADR
134 A1AA B1 00      CMP A 0:0
135 A1AC 27 04      DEQ MEM1
136
137 A1AE A7 00      STA A 0:1
138 A1B0 08
139 A1B1 08
140 A1B2 09      MEM1
141 A1B3 FF A1 05  STX ENHADR
142 A1B6 BC 7F FF  CPX ENHADR
143 A1B9 27 02      DEQ MEM2
144 A1BB 0C
145 A1BC 39
146 A1BD 00      MEM2
147 A1BE 39
148
149 A1BF CE A2 37  REAPV LDX 0MSG1
150 A1C2 B0 A0 1E  JSR PSTPUG
151 A1C5 FE A1 03  EXIT LDX 0ECADR
152 A1C8 0C A1 05  CPX ENHADR
153 A1CB 27 20      DEQ CLOSE
154
155 A1CD A6 00      SAVE LBA A 0:1
156 A1CF 08
157 A1D0 B4 7F      AND A 0:7F
158 A1D2 B1 20      CMP A 0:20
159 A1D4 74 04      DEQ SAVE1
160 A1D6 A1 00      CMP A 0:00
161 A1D8 24 0E      DEQ SAVE2
162 A1DA FF A1 03  SAVE1 STX 0ECADR
163 A1DB CE A0 40  LDX 0FCB
164 A1DD B0 A0 04  JSR FMS
165 A1E3 24 1A      DEQ 0R0D
166 A1E5 FE A1 03  LDX 0ECADR
167 A1E8 3C A1 05  SAVE2 CPX ENHADR
168 A1ED 24 00      DEQ SAVE
169
170 A1ED CE A0 40  CLOSE LDX 0FCB
171 A1F0 B4 04      LBA A 04
172 A1F2 A7 00      STA A 0:1
173 A1F4 B0 B4 04  JSR FMS
174 A1F7 27 0C      DEQ EXITE
175 A1F9 AA 01      FILERR LBA A 1:1

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176 A1FB B1 03      CMP A 03
177 A1FD 27 0C      DEQ ASKDEL
178
179 A1FF B0 A0 3F  ERROR JSR 0P0H10
180 A202 B0 B4 03  JSR FMSCLS
181 A205 2F A0 0C  CLR PDRECH
182 A208 7E A0 03  JMP WARD5
183
184 A20D CE A2 59  ASKDEL LDX 0P0H10
185 A210 B0 1C      JSR ASK
186 A210 24 F3      DEQ EXITE
187
188 A212 CE A2 7C  LDX 0VSC3
189 A215 B0 15      JSR ASK
190 A217 24 0C      DEQ EXITE
191
192 A219 CE A0 00  LDX 0FCB
193 A21C B4 0C      LBA A 012
194 A21E A7 00      STA A 0:1
195 A 0 B0 B4 0A  JSR FMS
196 A223 24 04      DEQ ERROR
197 A225 B0 24      LBA A 34:1
198 A227 A7 04      STA A 4:1
199 A229 7E A1 1E  JMP OPEN
200
201 A22C B0 A0 1E  ASK JSR PSTPUG
202 A22F B0 A0 15  JSR DETOUR
203 A232 B4 5F      AND A 0:5F
204 A234 B1 59      CMP A 0:1
205 A236 39
206 A237 4D      MSG1 FCC
207 A238 04      FCB 4
208 A239 4D      MSG2 FCC
209 A23A 04      FCB 4
210 A23C 41      MSG3 FCC
211 A23D 04      FCB 4
212 A23E 52      MSG4 FCC
213 A241 04      FCB 4
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NO ERRORS DETECTED

PROGRAM SCIPK01

(* SCIENTIFIC FUNCTIONS *****
 IF YOU USE THIS PACKAGE IN A PROGRAM, THE FOLLOWING CONSTANT
 AND VARIABLE DECLARATIONS MUST BE MADE AT THE START OF YOUR
 PROGRAM SO THEY ARE GLOBAL FOR ALL OF THE FUNCTIONS AND
 PROCEDURES HERE. *)

```

CONST
  PI=3.14159265358
  LOG10=2.302585093
  VAR
    E.Y.N.THETA I REAL

```

(* POLYNOMIAL APPROXIMATION CALCULATIONS FOR SINE *****
 FUNCTION POLY(X,B0,B1,B2,B3,B4,B5,B6,B7,B8,B9,S10 : REAL) : REAL

```

BEGIN
  POLY:=((((((((((S10*B0+B1)*B2+B3)*B4+B5)*B6+B7)*B8+B9)*B10)+S11)*B12+B13)*B14+B15)*B16+B17)*B18+B19)*B20+B21)*B22+B23)*B24+B25)*B26+B27)*B28+B29)*B30+B31)*B32+B33)*B34+B35)*B36+B37)*B38+B39)*B40+B41)*B42+B43)*B44+B45)*B46+B47)*B48+B49)*B50+B51)*B52+B53)*B54+B55)*B56+B57)*B58+B59)*B60+B61)*B62+B63)*B64+B65)*B66+B67)*B68+B69)*B70+B71)*B72+B73)*B74+B75)*B76+B77)*B78+B79)*B80+B81)*B82+B83)*B84+B85)*B86+B87)*B88+B89)*B90+B91)*B92+B93)*B94+B95)*B96+B97)*B98+B99)*B100+B101)*B102+B103)*B104+B105)*B106+B107)*B108+B109)*B110+B111)*B112+B113)*B114+B115)*B116+B117)*B118+B119)*B120+B121)*B122+B123)*B124+B125)*B126+B127)*B128+B129)*B130+B131)*B132+B133)*B134+B135)*B136+B137)*B138+B139)*B140+B141)*B142+B143)*B144+B145)*B146+B147)*B148+B149)*B150+B151)*B152+B153)*B154+B155)*B156+B157)*B158+B159)*B160+B161)*B162+B163)*B164+B165)*B166+B167)*B168+B169)*B170+B171)*B172+B173)*B174+B175)*B176+B177)*B178+B179)*B180+B181)*B182+B183)*B184+B185)*B186+B187)*B188+B189)*B190+B191)*B192+B193)*B194+B195)*B196+B197)*B198+B199)*B200+B201)*B202+B203)*B204+B205)*B206+B207)*B208+B209)*B210+B211)*B212+B213)*B214+B215)*B216+B217)*B218+B219)*B220+B221)*B222+B223)*B224+B225)*B226+B227)*B228+B229)*B230+B231)*B232+B233)*B234+B235)*B236+B237)*B238+B239)*B240+B241)*B242+B243)*B244+B245)*B246+B247)*B248+B249)*B250+B251)*B252+B253)*B254+B255)*B256+B257)*B258+B259)*B260+B261)*B262+B263)*B264+B265)*B266+B267)*B268+B269)*B270+B271)*B272+B273)*B274+B275)*B276+B277)*B278+B279)*B280+B281)*B282+B283)*B284+B285)*B286+B287)*B288+B289)*B290+B291)*B292+B293)*B294+B295)*B296+B297)*B298+B299)*B300+B301)*B302+B303)*B304+B305)*B306+B307)*B308+B309)*B310+B311)*B312+B313)*B314+B315)*B316+B317)*B318+B319)*B320+B321)*B322+B323)*B324+B325)*B326+B327)*B328+B329)*B330+B331)*B332+B333)*B334+B335)*B336+B337)*B338+B339)*B340+B341)*B342+B343)*B344+B345)*B346+B347)*B348+B349)*B350+B351)*B352+B353)*B354+B355)*B356+B357)*B358+B359)*B360+B361)*B362+B363)*B364+B365)*B366+B367)*B368+B369)*B370+B371)*B372+B373)*B374+B375)*B376+B377)*B378+B379)*B380+B381)*B382+B383)*B384+B385)*B386+B387)*B388+B389)*B390+B391)*B392+B393)*B394+B395)*B396+B397)*B398+B399)*B400+B401)*B402+B403)*B404+B405)*B406+B407)*B408+B409)*B410+B411)*B412+B413)*B414+B415)*B416+B417)*B418+B419)*B420+B421)*B422+B423)*B424+B425)*B426+B427)*B428+B429)*B430+B431)*B432+B433)*B434+B435)*B436+B437)*B438+B439)*B440+B441)*B442+B443)*B444+B445)*B446+B447)*B448+B449)*B450+B451)*B452+B453)*B454+B455)*B456+B457)*B458+B459)*B460+B461)*B462+B463)*B464+B465)*B466+B467)*B468+B469)*B470+B471)*B472+B473)*B474+B475)*B476+B477)*B478+B479)*B480+B481)*B482+B483)*B484+B485)*B486+B487)*B488+B489)*B490+B491)*B492+B493)*B494+B495)*B496+B497)*B498+B499)*B500+B501)*B502+B503)*B504+B505)*B506+B507)*B508+B509)*B510+B511)*B512+B513)*B514+B515)*B516+B517)*B518+B519)*B520+B521)*B522+B523)*B524+B525)*B526+B527)*B528+B529)*B530+B531)*B532+B533)*B534+B535)*B536+B537)*B538+B539)*B540+B541)*B542+B543)*B544+B545)*B546+B547)*B548+B549)*B550+B551)*B552+B553)*B554+B555)*B556+B557)*B558+B559)*B560+B561)*B562+B563)*B564+B565)*B566+B567)*B568+B569)*B570+B571)*B572+B573)*B574+B575)*B576+B577)*B578+B579)*B580+B581)*B582+B583)*B584+B585)*B586+B587)*B588+B589)*B590+B591)*B592+B593)*B594+B595)*B596+B597)*B598+B599)*B600+B601)*B602+B603)*B604+B605)*B606+B607)*B608+B609)*B610+B611)*B612+B613)*B614+B615)*B616+B617)*B618+B619)*B620+B621)*B622+B623)*B624+B625)*B626+B627)*B628+B629)*B630+B631)*B632+B633)*B634+B635)*B636+B637)*B638+B639)*B640+B641)*B642+B643)*B644+B645)*B646+B647)*B648+B649)*B650+B651)*B652+B653)*B654+B655)*B656+B657)*B658+B659)*B660+B661)*B662+B663)*B664+B665)*B666+B667)*B668+B669)*B670+B671)*B672+B673)*B674+B675)*B676+B677)*B678+B679)*B680+B681)*B682+B683)*B684+B685)*B686+B687)*B688+B689)*B690+B691)*B692+B693)*B694+B695)*B696+B697)*B698+B699)*B700+B701)*B702+B703)*B704+B705)*B706+B707)*B708+B709)*B710+B711)*B712+B713)*B714+B715)*B716+B717)*B718+B719)*B720+B721)*B722+B723)*B724+B725)*B726+B727)*B728+B729)*B730+B731)*B732+B733)*B734+B735)*B736+B737)*B738+B739)*B740+B741)*B742+B743)*B744+B745)*B746+B747)*B748+B749)*B750+B751)*B752+B753)*B754+B755)*B756+B757)*B758+B759)*B760+B761)*B762+B763)*B764+B765)*B766+B767)*B768+B769)*B770+B771)*B772+B773)*B774+B775)*B776+B777)*B778+B779)*B780+B781)*B782+B783)*B784+B785)*B786+B787)*B788+B789)*B790+B791)*B792+B793)*B794+B795)*B796+B797)*B798+B799)*B800+B801)*B802+B803)*B804+B805)*B806+B807)*B808+B809)*B810+B811)*B812+B813)*B814+B815)*B816+B817)*B818+B819)*B820+B821)*B822+B823)*B824+B825)*B826+B827)*B828+B829)*B830+B831)*B832+B833)*B834+B835)*B836+B837)*B838+B839)*B840+B841)*B842+B843)*B844+B845)*B846+B847)*B848+B849)*B850+B851)*B852+B853)*B854+B855)*B856+B857)*B858+B859)*B860+B861)*B862+B863)*B864+B865)*B866+B867)*B868+B869)*B870+B871)*B872+B873)*B874+B875)*B876+B877)*B878+B879)*B880+B881)*B882+B883)*B884+B885)*B886+B887)*B888+B889)*B890+B891)*B892+B893)*B894+B895)*B896+B897)*B898+B899)*B900+B901)*B902+B903)*B904+B905)*B906+B907)*B908+B909)*B910+B911)*B912+B913)*B914+B915)*B916+B917)*B918+B919)*B920+B921)*B922+B923)*B924+B925)*B926+B927)*B928+B929)*B930+B931)*B932+B933)*B934+B935)*B936+B937)*B938+B939)*B940+B941)*B942+B943)*B944+B945)*B946+B947)*B948+B949)*B950+B951)*B952+B953)*B954+B955)*B956+B957)*B958+B959)*B960+B961)*B962+B963)*B964+B965)*B966+B967)*B968+B969)*B970+B971)*B972+B973)*B974+B975)*B976+B977)*B978+B979)*B980+B981)*B982+B983)*B984+B985)*B986+B987)*B988+B989)*B990+B991)*B992+B993)*B994+B995)*B996+B997)*B998+B999)*B1000+B1001)*B1002+B1003)*B1004+B1005)*B1006+B1007)*B1008+B1009)*B1010+B1011)*B1012+B1013)*B1014+B1015)*B1016+B1017)*B1018+B1019)*B1020+B1021)*B1022+B1023)*B1024+B1025)*B1026+B1027)*B1028+B1029)*B1030+B1031)*B1032+B1033)*B1034+B1035)*B1036+B1037)*B1038+B1039)*B1040+B1041)*B1042+B1043)*B1044+B1045)*B1046+B1047)*B1048+B1049)*B1050+B1051)*B1052+B1053)*B1054+B1055)*B1056+B1057)*B1058+B1059)*B1060+B1061)*B1062+B1063)*B1064+B1065)*B1066+B1067)*B1068+B1069)*B1070+B1071)*B1072+B1073)*B1074+B1075)*B1076+B1077)*B1078+B1079)*B1080+B1081)*B1082+B1083)*B1084+B1085)*B1086+B1087)*B1088+B1089)*B1090+B1091)*B1092+B1093)*B1094+B1095)*B1096+B1097)*B1098+B1099)*B1100+B1101)*B1102+B1103)*B1104+B1105)*B1106+B1107)*B1108+B1109)*B1110+B1111)*B1112+B1113)*B1114+B1115)*B1116+B1117)*B1118+B1119)*B1120+B1121)*B1122+B1123)*B1124+B1125)*B1126+B1127)*B1128+B1129)*B1130+B1131)*B1132+B1133)*B1134+B1135)*B1136+B1137)*B1138+B1139)*B1140+B1141)*B1142+B1143)*B1144+B1145)*B1146+B1147)*B1148+B1149)*B1150+B1151)*B1152+B1153)*B1154+B1155)*B1156+B1157)*B1158+B1159)*B1160+B1161)*B1162+B1163)*B1164+B1165)*B1166+B1167)*B1168+B1169)*B1170+B1171)*B1172+B1173)*B1174+B1175)*B1176+B1177)*B1178+B1179)*B1180+B1181)*B1182+B1183)*B1184+B1185)*B1186+B1187)*B1188+B1189)*B1190+B1191)*B1192+B1193)*B1194+B1195)*B1196+B1197)*B1198+B1199)*B1200+B1201)*B1202+B1203)*B1204+B1205)*B1206+B1207)*B1208+B1209)*B1210+B1211)*B1212+B1213)*B1214+B1215)*B1216+B1217)*B1218+B1219)*B1220+B1221)*B1222+B1223)*B1224+B1225)*B1226+B1227)*B1228+B1229)*B1230+B1231)*B1232+B1233)*B1234+B1235)*B1236+B1237)*B1238+B1239)*B1240+B1241)*B1242+B1243)*B1244+B1245)*B1246+B1247)*B1248+B1249)*B1250+B1251)*B1252+B1253)*B1254+B1255)*B1256+B1257)*B1258+B1259)*B1260+B1261)*B1262+B1263)*B1264+B1265)*B1266+B1267)*B1268+B1269)*B1270+B1271)*B1272+B1273)*B1274+B1275)*B1276+B1277)*B1278+B1279)*B1280+B1281)*B1282+B1283)*B1284+B1285)*B1286+B1287)*B1288+B1289)*B1290+B1291)*B1292+B1293)*B1294+B1295)*B1296+B1297)*B1298+B1299)*B1300+B1301)*B1302+B1303)*B1304+B1305)*B1306+B1307)*B1308+B1309)*B1310+B1311)*B1312+B1313)*B
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27 * NOTE THAT THIS UTIL TESTS TO SEE IF PRINT ROUTINE IS LOADED
28 * IE PRINT.SYS. IF IT IS, P, IS NOT REQUIRED IN FRONT
29 * OF THE KEY COMMAND. IF P, IS NOT USED, AND PRINT.SYS IS NOT
30 * LOADED, THIS UTILITY EXITS TO FLEX WITH AN ERROR MESSAGE.
31 *
32 * SYNTAX: SET E OR SET F
33 *
34 * FLEX2 EQUATES LIBRARY
35 *
36 *
37 *
38 * FLEX2 EQUATES LIBRARY
39 *
40 *
41 *
42 0000 PORT0 EQU 0000
43 0001 PORT1 EQU 0001
44 0002 PORT2 EQU 0002
45 0003 PORT3 EQU 0003
46 0010 PORT4 EQU 0010
47 0014 PORT5 EQU 0014
48 0014 DRIVE SELECT REGISTER
49 0018 PORT6 EQU 0018
50 0018 DISK BIRTHAL REGISTER
51 0019 PORT7 EQU 0019
52 001A DISK TRACK REGISTER
53 001B DISK SECTOR REGISTER
54 001C DISK DATA REGISTER
55
56 2400 LOADER EQU 2400 FLEX DISK LOADER ADDRESS
57
58 000C PORECH EQU 000C
59
60 0040 FCB EQU 0040 FILE CONTROL BLOCK
61
62 * ITYBET CHARACTER PARAMETERS
63 * "D=000" MEANS DEFAULT VALUE IS HEX 00
64 * "H" MEANS CONTROL CHARACTER L
65 * "MUL" MEANS ASCII CONTROL CHARACTER IN THIS CASE A NULL
66
67 AC00 BSPACE EQU 0AC00 BACK SPACE D=000 YH (BS)
68 AC01 BELCHR EQU 0AC01 BELCHR CHAR D=010 YH (CAN)
69 AC02 COLCHR EQU 0AC02 END OF LINE CHAR D=032 YH (COLDN)
70 AC03 DEPTH EQU 0AC03 DEPTH COUNT D=0
71 AC04 WIDTH EQU 0AC04 WIDTH COUNT D=0
72 AC05 NULLS EQU 0AC05 NULL COUNT D=4
73 AC06 TABCHR EQU 0AC06 TAB CHAR D=0
74 AC07 BSPACE EQU 0AC07 BACK SPACE ECHO CHAR D=0
75 AC08 EJECT EQU 0AC08 EJECT COUNT D=0
76 AC09 PAUSE EQU 0AC09 PAUSE CONTROL D=00F 000-NO PAUSE
77 AC0A ESCAPE EQU 0AC0A ESCAPE CHAR D=013 (ESC)
78 AC0B WHRPLA EQU 0AC0B WHRPLA EQU 0AC0B SYSTEM DRIVE NUMBER D=0
79 AC0C WHRPLA EQU 0AC0C WHRPLA EQU 0AC0C RESERVED FOR SYSTEM
80 AC0D SYSTEM EQU 0AC0D SYSTEM DRIVE NUMBER D=0
81 AC0E DATE EQU 0AC0E DATE REGISTER
82 AC0F MONTH EQU 0AC0F MONTH BYTE
83 AC0F DAY EQU 0AC0F DAY BYTE
84 AC10 YEAR EQU 0AC10 YEAR BYTE
85 AC11 LSTTRM EQU 0AC11 LAST TERMINATOR
86 AC12 USRDBM EQU 0AC12 USER COMMAND TABLE ADDRESS
87 AC14 BUFPTR EQU 0AC14 LINE BUFFER POINTER
88 AC16 ESCRCH EQU 0AC16 ESCAPE RETURN REGISTER
89 AC18 CURCHR EQU 0AC18 CURRENT CHARACTER
90 AC19 PRECHR EQU 0AC19 PREVIOUS CHARACTER
91 AC1A CURLIN EQU 0AC1A CURRENT LINE NUMBER
92 AC1B LADDR EQU 0AC1B LOADER ADDRESS OFFSET
93 AC1C TRNSFR EQU 0AC1C TRANSFER FLAG
94 AC1E TRNSFR EQU 0AC1E TRANSFER ADDRESS
95 AC20 ERRNUM EQU 0AC20 ERROR NUMBER FROM FMS
96
97 0000 BUFPTR EQU 0000
98 0001 BUFPTR EQU 0001
99
100 0000 BOLD EQU 0000
101 0001 MARKS EQU 0001
102 0002 RETER EQU 0002
103 0003 LUCH EQU 0003
104 0004 BLOC EQU 0004
105 0005 OUTCH EQU 0005
106 0012 QUIDIQ EQU 0012
107 0015 DETCHR EQU 0015
108 0018 PUTCHR EQU 0018
109 001B INRPT EQU 001B
110 001E P RUC EQU 001E
111 0021 CLASS EQU 0021
112 0024 PCRLF EQU 0024
113 0027 NATCH EQU 0027
114 002A RETRIO EQU 002A
115 002D GETFIL EQU 002D
116 0030 LOAD EQU 0030
117 0033 SETEXT EQU 0033
118 0036 ADDR EQU 0036
119 0039 OUTDEC EQU 0039
120 003C OUTHEX EQU 003C
121 003F OPTERR EQU 003F
122 0042 GETHEX EQU 0042
123 0045 OUTADR EQU 0045
124 0048 INDEC EQU 0048
125 0049 OUTADR EQU 0049
126
127 0103 FMSQLB EQU 0103
128 0106 FMS EQU 0106
129
130 0100 READ EQU 0100 READ SECTION
131 0101 WRITE EQU 0101 WRITE SECTION
132 0102 VERIFY EQU 0102 VERIFY SECTION
133 0103 RESTOR EQU 0103 RESTORE TO TRACK ZERO
134 0104 DSELECT EQU 0104 DRIVE SELECT
135 0105 DREADY EQU 0105 DRIVE READY
136 0106 DREADY EQU 0106 QUICK DRIVE READY
137
138
139 ACE4 POWI EQU 0ACE4
140 ACC0 PIKEI EQU 0ACC0
141
142 A100 ORC EQU 0A100
143
144 A100 00 AD 27 START JBR NATCH SET COMMAND
145 A103 34 PBI A JBR SAVE IT
146 A104 00 AD 27 JBR NATCH

```

```

147 A107 04 AC E4 LDA A POUT SEE IF PRINT.SYS LOADED
148 A10A 01 39 CMP A 0139
149 A10C 26 03 BNE PROCO
150 A10E 7E A1 33 JVP MOPRT INITIALIZE PRINTED PORT
151 A111 00 AC C0 PROCO JBR Pout
152 A114 32 MUL A
153 A115 CE A1 61 LDX A JTAB JUMP TABLE START
154 A118 A1 00 PROCI CMP A 0
155 A11A 27 0A BEQ FOUND1 COMMAND FOUND
156 A11C 08 INX
157 A11D 08 INX
158 A11E 08 INX
159 A11F 0C A1 78 CPZ DCMSTAB
160 A122 27 0A BEQ MSTERM NOT FOUND
161 A124 20 F2 BRA PROCI
162 A126 E1 01 FOUND1 LDX 1
163 A128 4E 00 JVP DIX GET START ADDRESS FOR COMMAND
164
165
166
167 A12A CE A1 7A WFERR LDX 0WSTR NOT FOUND
168 A12D 00 AD 1E JBR PSTRNG
169 A130 7E AD 03 JVP MARKS EXIT TO FLEX
170
171 A133 CE A1 09 MOPRT LDX 0MPRINT PRINT ROUTINE NOT LOADED
172 A134 00 AD 1E JBR PSTRNG
173 A137 7E AD 03 JVP MARKS EXIT
174
175
176
177 A13C 06 1C SETX LBA A 001C 0.3 CPI
178 A13E 20 10 BRA OUT
179
180 A140 06 1D SETY LBA A 001D 1.0 CPI
181 A142 20 17 BRA OUT
182
183 A144 06 1E SETH LBA A 001E 1.2 CPI
184 A146 20 13 BRA OUT
185
186 A148 06 1F SETB LBA A 001F 1.6 CPI
187 A14A 20 0F BRA OUT
188
189 A14C 06 01 SETE LBA A 001E 1.0 CPI
190 A14E 20 00 BRA OUT
191
192 A150 06 02 SETD LBA A 0002 REGULAR OR NORMAL WIDTH
193 A152 20 07 BRA OUT
194
195 A154 06 02 SETC LBA A 0002 SET NORMAL WIDTH
196 A156 00 AC E4 JBR POUT
197 A159 06 1E LBA A 001E SET 1.2 CPI
198
199 A15B 00 AC E4 OUT JBR POUT OUTPUT TO PRINTED
200 A15E 7E AD 03 JVP MARKS RETURN TO FLEX
201
202
203
204 A161 JTAB EQU 0
205
206 A163 50 FCB 'X'
207 A165 A1 3C FCB SETX
208 A167 57 FCB 'M'
209 A169 A1 40 FCB SETM
210 A16B 4E FCB 'M'
211 A16D A1 44 FCB SETH
212 A16F 53 FCB 'S'
213 A171 A1 48 FCB SETS
214 A173 45 FCB 'E'
215 A175 A1 4C FCB SETE
216 A177 52 FCB 'H'
217 A179 A1 50 FCB SETH
218 A17B 43 FCB 'C'
219 A17D A1 54 FCB SETC
220 A17F 4E ENBTAB EQU 0
221
222
223
224 A17A 43 HFSTR FCC /COMMAND NOT FOUND /
225 A180 04 FCB 4
226 A182 04 HPRINT FCC /PRINT.SYS NOT LOADED /
227 A184 04 FCB 4
228 A186 04 LWD STAB1

```

NO ERROR(S) DETECTED

SET PRINTED IN A/BASIC

5-24-80 PAGE 1

```

REN SETBAS SET PRINTED IN A/BASIC MUST USE P, PRECEDING
REN COMMAND
OPT S
BASE=030
10 REN POKE SWITCH FOR PROMPT TO TERMINAL
POKE(-21470)-1
PRINT
PRINT "PRINTER HOME"
PRINT M0
REN POKE SWITCH FOR OUTPUT TO PRINTED
POKE(-21470)=0
IF M0="X" THEN 31
IF M0="M" THEN 32
IF M0="H" THEN 33
IF M0="S" THEN 34
IF M0="E" THEN 35
IF M0="R" THEN 36
IF M0="C" THEN 37
PRINT "ILLEGAL COMMAND" : GOTO 10
31 PRINT CHR(20) : GOTO 80
32 PRINT CHR(20) : GOTO 80

```

```

53      PRINT CHR$(10) : GOTO 80
54      PRINT CHR$(11) : GOTO 80
55      PRINT CHR$(12) : GOTO 80
56      PRINT CHR$(13) : GOTO 80
57      PRINT CHR$(21):CHR$(30) : GOTO 80

80      END
      STOP

```

ALTERNATE SET PRINTER IN A/BASIC

5-24-80

PAGE 1

```

REN      SETBAS SET PRINTER IN A/BASIC, MUST USE P. PRECEEDING
REN      THE COMMAND.

BASE=530

10  REN      POKE SWITCH FOR PROMPT TO TERMINAL
      POKE (-21679)=-1

      PRINT "PRINTER ADDR:"
      INPUT N1

REN      POKE SWITCH FOR OUTPUT TO PRINTER
      POKE (-21470)=0

      IF N1<"1" THEN 20
      PRINT CHR$(20) : GOTO 90

20      IF N1<"2" THEN 30
      PRINT CHR$(29) : GOTO 90

30      IF N1<"3" THEN 40
      PRINT CHR$(30) : GOTO 90

40      IF N1<"4" THEN 50 : GOTO 90
      PRINT CHR$(31) : GOTO 90

50      IF N1<"5" THEN 60
      PRINT CHR$(1) : GOTO 90

60      IF N1<"6" THEN 70
      PRINT CHR$(2) : GOTO 90

70      IF N1<"7" THEN 80
      PRINT CHR$(21):CHR$(30) : GOTO 90

80      PRINT "ILLEGAL COMMAND"
      GOTO 10

90      STOP
      END

```

SET PRINTER IN PASCAL

5-24-80

PAGE 1

```

PROGRAM SETPRINT;
(* ENTER WITH P. PRECEEDING NAME *)

CONST
  EXTRAWIDE = 512;
  WIDE      = 601;
  NORMAL    = 611;
  SKINNY    = 915;
  ENHANCED  = 1;
  REGULAR   = 2;
  SWITCH    = 6422;
  ON        = 655;
  OFF       = 0;

VAR
  MODE : CHAR;

BEGIN
  POKE (SWITCH+ON) (* SWITCH OUTPUT TO TERMINAL *)
  WRITE ('PRINTER MODE ' *);
  READ (MODE);
  WRITE(' ');
  POKE (SWITCH+OFF);

  CASE MODE OF
    '1': WRITE (CHR(EXTRAWIDE));
    '2': WRITE (CHR(WIDE));
    '3': WRITE (CHR(NORMAL));
    '4': WRITE (CHR(SKINNY));
    '5': WRITE (CHR(ENHANCED));
    '6': WRITE (CHR(REGULAR));
    '7': WRITE (CHR(REGULAR));
    'C': WRITE (CHR(REGULAR));
  END; (* CASE MODE OF *)

END. (* SETPRINT *)

```

TEST OF SET FROM BASIC

5-24-80

PAGE 1

```

10 OPEN "O.PRINT" AS O
20 PRINT O
30 PRINT O; "NORMAL CONDITION"
40 EXEC, "SET S"
50 PRINT O; "MOST COMMON PRINTING, 16 CPI"
60 EXEC, "SET W"
70 PRINT O; "WIDE NORMAL AT 10 CPI"
80 EXEC, "SET X"
90 PRINT O; "WIDEST PRINTING 8.3 CPI"
100 EXEC, "SET S"
110 EXEC, "SET E"
120 PRINT O; "16 CPI DOUBLE WIDE"
130 EXEC, "SET W"
140 PRINT O; "12 CPI DOUBLE WIDE"
150 EXEC, "SET W"
160 PRINT O; "10 CPI DOUBLE WIDE"
170 EXEC, "SET X"

```

```

180 PRINT O; "8.3 CPI DOUBLE WIDE"
190 EXEC, "SET C" : REM RESTORE TO NORMAL
200 PRINT O
210 CLOSE O
220 END

```

NORMAL CONDITION

```

MOST COMMON PRINTING 16 CPI
WIDE NORMAL AT 10 CPI
WIDEST PRINTING 8.3 CPI
16 CPI DOUBLE WIDE
12 CPI DOUBLE WIDE
10 CPI DOUBLE WIDE
8.3 CPI DOUBLE WIDE

```

HUMBUG

HUMBUG - A NEW 6800 MONITOR
by Dale L. Puckett

This month we look at HUMBUG, a new monitor which should prove to be a lot of help to the 6800 user programming in assembly or machine language without the benefit of a disk system.

HUMBUG was written by Pete Stark and is available from STAR-KITS, P. O. Box 209, Mt. Kisco, New York, 10549. There are 2K, 3K and 4K versions burned in 2708 or 2716 EPROMs. All versions come with a complete source listing.

The 2K version in a 2716 sells for \$40. The 4K version is \$65. In the 2708 form HUMBUG will cost you \$45 for the 2K version, \$60 for 3K of code and \$75 for 4K.

The source code listing is available on FLEX 2.0, mini-FLEX and Percom disks, and on paper. The listing costs \$20. The source on disk costs \$25.

The 2716 versions were designed to work on the SWTPC MP-A2 CPU board. If you buy the 2708 version, you must supply a separate EPROM board.

COMPATIBILITY

HUMBUG maintains all of SWTBUG's major subroutine entry points. This allows all of your old programs to run without change. Also, the SWTBUG scratchpad addresses were left intact.

HUMBUG gives you full control over the system from your keyboard. You can even turn various ports on and off during the execution of a program. Another feature allows you to abort programs from the keyboard without pushing the RESET button.

Additionally, Stark has added extended debugging facilities. These include an impressive handling of multiple breakpoints and a special single stepping mode.

MIKBUG and SWTBUG both used one stack. HUMBUG uses two. By keeping the user and monitor stacks completely separate, Stark has insured that the two will never clobber each other.

I/O SCHEME

HUMBUG uses port 1 for all monitor input and most output. An ACIA such as the SWTPC MP-S or Star-Kits CT-PS card must be installed. This monitor uses an address called PORADD to allow you to redirect the control port by simply changing the \$8004 at PORADD to the address of a port where you have installed a serial interface card.

It is also possible for HUMBUG to output to a second serial card installed at port 0 or to special

output routines like those that drive my IBM selectric. HUMBUG continuously checks the control port for an ASCII DC3 or XOFF character (control-C). When it receives this character it echoes a BELL and stops all output. It then inputs one more character to check for any port change commands.

Options include: "O," which toggles port 0 on and off; "I," which does the same for port 1; "D," which turns the special user written port routine on and off; and "P," which turns the pause mode on and off. This mode is used for video terminals and stops the output automatically after every 16 lines.

If a carriage return is received immediately after the XOFF the program is aborted and control returns to HUMBUG. Unless, that is, the program has changed the address in HUMBUG's return address pointer to send control back to itself. Stark didn't miss a thing.

COMMANDS

Because of the excellent prompting this monitor is almost foolproof. For example if you type AD which is HUMBUG's command for a formatted ASCII dump, it will ask you FROM and wait for you enter an address. Then, it will ask you, TO. After you type this second address your dump will begin. And check this, if you are working with the same block of addresses you may simply type a carriage return instead of the FROM address.

The AD command prints the starting address of the dump at the beginning of a line followed by the ASCII characters for the next 16 bytes. If a location has a value of less than \$1F, a period '.' is printed. Also, the parity bit is ignored by this dump routine.

Let's look at the rest of HUMBUG's commands now. They are in alphabetical order in the fine users manual supplied by STAR-KITS. We will leave them that way here.

"AI" is the command to input an ASCII string. It prompts you for a FROM/TO pair after which you simply type in ASCII characters. If you type more text than you have allowed space for when you answered the FROM/TO prompt, the routine will begin printing ERROR on the screen until you type XOFF.

If you run out of text before you run out of allotted space, you may simply type XOFF/CR. When you do this, HUMBUG will automatically change the FROM/TO pair so that if you wanted a dump of the area to check the accuracy of your typing you could simply answer the FROM prompt with a carriage return and you will automatically dump the correct portion of memory.

"AO" stands for ASCII output and allows you to output the contents of memory to port 1. It uses the FROM/TO prompt and is very useful for copying tapes, etc.

Typing "BP" will give you a listing of the four breakpoints that you have set. It gives you the address and the opcode or instruction normally stored at each breakpoint.

"BR" is the command that allows you to set breakpoints. It prompts you for the number of the breakpoint you wish to set or change and the address you desire to change it to. If you enter a CR to answer the address prompt the breakpoint will be removed. If you enter a valid address, that address will become a breakpoint.

"CL" will clear the standard SWTPC terminal screen. It outputs a \$10, \$16 string. "CO" allows you

continue execution of a program after reaching a breakpoint. It also allows you continue at full speed after a sequence of single step operations. You must however, remove the breakpoint before continuing or you will not be able to proceed.

Typing "CS" will print a 16 bit checksum of the area within the FROM/TO range. You are prompted for the FROM/TO values.

"DE" is the command for a mini-disassembler. It prints a formatted dump with the memory contents formatted into one, two or three byte groups. In other words, if it encounters a CLR A instruction, only "\$4F" will be printed on that line. If it hits a JMP MIKBUG, it would print "7E E0D0" on one line, etc. It does not print the mnemonic value of the instructions.

"EN" outputs the standard end-of-tape code. This includes the contents of the program counter followed by an "S9".

"FA" is a fastype mode. It generates a tape which may be used for input to an incompatible editor or BASIC Interpreter, etc. The carriage return is followed with a one-half second pause and all other control commands are eliminated from the data stream.

"FD" is the command you would use to boot a FLEX disk. "FI" is a short search routine which allows you to find one, two or three byte values. It prompts for the number of bytes you wish to search for, the value of those bytes and the FROM/TO pair which will tell the routine where to look.

"FM" allows you to fill memory. It prompts you for the area to fill with the standard FROM/TO prompt and prompts you for the value of the fill byte. One excellent use of this command is to fill all unused memory with SWI commands, "3 ". If you do this and your program bombs, the resulting register dump will tell you where it went astray.

"GO" will always jump to the address stored at \$A048. "GA" will print out the contents (address) stored at \$A048. It merely prints the program counter and shows you where the computer would start execution if you typed "GO."

"HD" will print a standard hexadecimal dump of memory between FROM and TO. The address appears at the beginning of each line followed by sixteen bytes.

"HE" stands for Help! It will print a summary of HUMBUG commands. It is only installed in the 2K versions.

"IQ" enables an interrupt routine so that the serial printer on port 0 can be used with interrupts to fill and print from a 1K buffer. This allows you to print and compute at the same time. It is available in the 4K version only.

"JU" is similar to the "J" command in SWTBUG. However, it uses a JSR instruction instead of a JMP instruction. This means that if there is an RTS at the end of the users program control will return to HUMBUG. It gives you an easy method of testing subroutines.

"LO" will load a tape on the control terminal. "MC" will compare the contents of two areas of memory. It prints out the memory contents for each byte that is different. It prompts you for the FROM/TO combination for the first memory area and the FROM address of the second. This particular command's output is one of the only HUMBUG formats I didn't like. It dumps its output continuously without the benefit of any carriage return/line feed pairs and is hard to read.

"ME" stands for memory examine and change and works exactly like SWTBUG's M command.

"MO" is the move memory command. The contents of memory in an area you name by answering the FROM/TO prompts is moved to another area. It should be noted that this routine even allows you to move data where part of the new area overlaps the original area. This is a feature you don't see too often.

"MT" is a simple rotating bit memory test. It checks the area within the FROM/TO area and prints a "+" sign if everything is ok. If there is a memory problem, it prints the address of the bad location and the contents of that location at the time the test failed.

"PU" is similar to SWTBUG's "P" command except that it prompts for the addresses you desire to punch.

"RE" which stands for register examine is a step ahead of SWTBUG's "R" also. The main improvement is in the format of the printing of the value of the CC register. HUMBUG prints it in binary which allows you to visualize which bits are set much easier. Also the printed stack pointer address tells you where the stack was pointing just before the breakpoint, rather than where it was pointing after returning to the monitor. It makes a whole lot of sense.

"SS" stands for single step. It prints the register contents after executing each instruction. It must however follow the "ST" or start single stepping command. "ST" prompts for the address where you want to start single stepping. "SS" prints out two lines. The first shows you the address and code of the instruction which you are checking. The second line is a register dump after the instruction has been executed. It is really a help for spotting logic errors in your code.

Other commands include "ZZ" which is a simple jump to \$C000, the address of Percom's DOS, and 30 or 12. The latter pair allows you to change your apparent baud rate by changing the initialization on the ACIA. If you change from a 16 times clock to a 64 times clock you will slow down your output baud rate by 4. I must be honest and say that this particular feature did not work for me when I tried it. I am sure it has something to do with the way I have my hardware configured but I just don't have the time to pursue it.

MEMORY REQUIREMENTS

The 2K versions only use the 128-byte scratchpad RAM at \$A000 on the MP-A or MP-A2 CPU cards. The 3K version requires that you have another scratchpad RAM at \$D000-\$D07F. The instruction manual shows you a very simple and inexpensive way to implement this additional memory.

The 4K versions require an additional 1K buffer at \$D400 for use as a buffer for the interrupt driven printer. Again, the users manual tells you how to set it all up. It even shows you how to convert an old 4K memory board for use at \$D400.

CONCLUSION

HUMBUG is one of the better monitors to come down the pike. The built in debugging utilities would have helped me a great deal several years ago when I was struggling to learn this business without the benefit of a disk system.

It is so well prompted that you could almost use it without reading the users manual. Once you know

the two letter codes you are home free.

The manual itself is attractively packaged and contains all the information you will ever need to exercise HUMBUG. The source code provided is extremely well commented and is an educational tool itself. I would highly recommend that anyone interested in talking to the 6800 right down at the gut level use this tool to speed them up the learning curve. I only wish it had been available three years ago.

Note: The problem mentioned above under the Command 'LO' is apparent only on narrow CRT lines (32 or 64 characters per line). CRT displays that exhibit 80 characters per line do honor the CR/LF and are more readable.

MC6883

The Motorola MC6883 is the 'heart' of the Radio Shack TRS80C Color Computer, that is being delivered now. It is a new device and little has been published on it so far. It uses a 6809E and other Motorola devices - unfortunately no S50 bus. The following technical data is presented due to the large amount of interest indicated by the letters and calls we have received. This is poorly reproduced; we could do no better. We run it hoping that with a little guessing and magnifying glass operation you may garner some interesting facts and values. We trust that this machine will allow the beginning user to realize what a fine device the 6809 is; and then upgrade to a 'real' 6809 computer - just like yours and mine!

MC 6883
(74LS783)

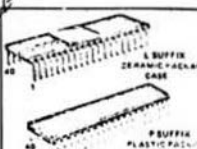
Advance Information

The Motorola MC6883 brings together the MC6809E (NPU), the MC6847 (Color Video Display Generator) and Dynamic RAM to form a highly effective, compact and cost effective computer and display system.

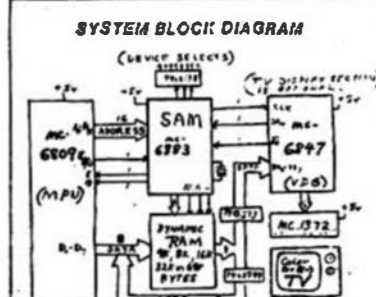
- MC6809E and MC6847 (VDC) compatible
- Transparent NPU/VDC/Memfresh
- RAM size: 4K, 8K, 16K, 32K or 64K bytes (dynamic or static)
- Addressing range: 96K bytes
- Single crystal provides all timing
- Register programmable:
 - VDC addressing modes
 - VDC offset (0 to 64K)
 - RAM size
 - Bank switch
 - NPU rate (crystal + 16 or 18)
 - NPU rate...address dependent or independent
- System device selects decoded 'on chip'
- Timing is optimized for standard RAMs
- +5V only operation
- Easy synchronization of multiple SAM systems
- DMA mode

SYNCHRONOUS ADDRESS MULTIPLEXER

(LOW POWER SHOTTRAY)



SYSTEM BLOCK DIAGRAM



PIN ASSIGNMENT

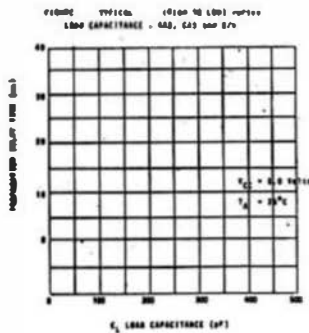
1	ALL	VCC	18
2	A10	A13	19
3	A5	A13	20
4	A8	A13	21
5	OSC IN	A15	22
6	OSC OUT	27	23 (GND)
7	VCLK	26	24
8	DMA	25	25
9	R3	24	26
10	R2	23	27
11	R1	22	28
12	A15	21	29
13	A14	20	30
14	A13	19	31
15	V/D	51	32
16	A0	52	33
17	A1	57	34
18	A2	56	35
19	A3	55	36
20	GND	54	37

ELECTRICAL CHARACTERISTICS (unless otherwise noted specifications apply over recommended power supply and temperature ranges.)

Characteristic	Symbol	Min	Typ	Max	Units
Power Supply Current	I _{cc}	-	100	230	mA
Output Short-Circuit Current	I _{ss}	30	-	325	mA

'88 Micro Journal

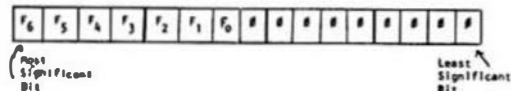
25



1C = 64x64
2C = 128x64
3C = 128,96
6C = 128,192
6R = 256,192

VDC ADDRESS OFFSET

Seven bits ($P_6, P_5, P_4, P_3, P_2, P_1$ and P_0) determine the "STARTING ADDRESS" for the video display. The "Starting Address" is defined as "the address corresponding to data displayed in the UPPER LEFT corner of the T.V. screen". Thus, the "Starting Address" is shown below in binary:



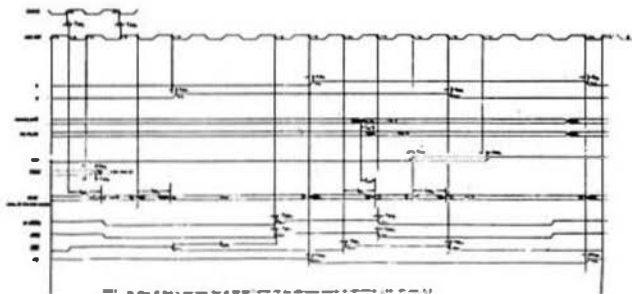
Note that the "Starting Address" may be placed anywhere within the 64K address space with a resolution of 1K (the size of one alphanumeric page).

The P_6, P_5 bits take effect during the T.V. vertical synchronization pulse (i.e., when P_7 from MC6847 is low).

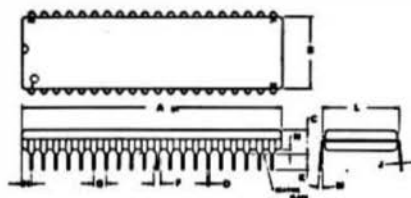
PAGE SWITCH

One bit (P_1) is used "in place of" A_{15} from the 6809 in order to refer access within \$8000-\$FFFF to one of two 32K byte pages of RAM. If the system does not use more than 32K bytes, P_1 can be ignored.

When using 4K x 1 RAMs, two banks of eight IC's are allowed. This accounts for Addresses \$8000-\$FFFF. Also, this same RAM can be addressed at \$2000-\$3FFF, \$1000-\$55FFF and \$6000-\$7FFFF.

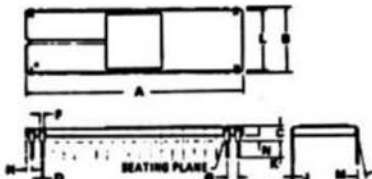


P SUPPLY
PLASTIC PACKAGE
CASE 711-03



MILLIMETERS		INCHES	
MIN	MAX	MIN	MAX
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050

CASE 711-02



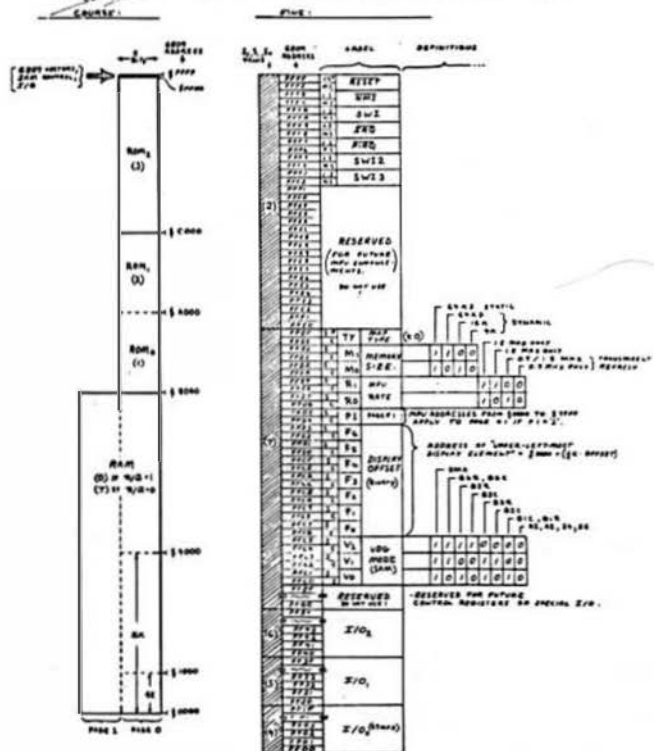
MILLIMETERS		INCHES	
MIN	MAX	MIN	MAX
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050
1.27	1.27	0.050	0.050

CASE 715-02

NOTE:
1. LEADS, TRUE POSITIONED WITHIN
0.25 mm (0.010) DIA (AT SEATING
PLANE) AT MAX. MAT'L
CONDITION.

L SUPPLY
CERAMIC PACKAGE
CASE 715-02

Colo Computer S.A.M. COMPUTER MEMORY MAP (CONT.)



The diagram illustrates the internal structure of a cryptographic machine, showing the arrangement of rotors and their electrical connections. The components are organized as follows:

- Left Section (SIGNALS):** A vertical column of 26 positions, each corresponding to a letter of the alphabet (A-Z). Each position has a label on the left (e.g., A, B, C, ..., Z) and a label on the right (e.g., 1, 2, 3, ..., 26). The connections between the rotors and the signals are shown as lines and dots.
- Top Section (SIGNALS):** A horizontal row of 26 positions, each corresponding to a letter of the alphabet (A-Z). Each position has a label on the top (e.g., A, B, C, ..., Z) and a label on the bottom (e.g., 1, 2, 3, ..., 26). The connections between the rotors and the signals are shown as lines and dots.
- Right Section (SIGNALS):** A horizontal row of 26 positions, each corresponding to a letter of the alphabet (A-Z). Each position has a label on the right (e.g., A, B, C, ..., Z) and a label on the left (e.g., 1, 2, 3, ..., 26). The connections between the rotors and the signals are shown as lines and dots.
- Central Section (Rotors):** A series of rotors, each labeled with a letter (A-Z). The rotors are arranged in a vertical column. The connections between the rotors and the signals are shown as lines and dots.
- Bottom Section (SIGNALS):** A horizontal row of 26 positions, each corresponding to a letter of the alphabet (A-Z). Each position has a label on the bottom (e.g., A, B, C, ..., Z) and a label on the top (e.g., 1, 2, 3, ..., 26). The connections between the rotors and the signals are shown as lines and dots.

The diagram is a technical drawing of a complex mechanical device, showing the internal components and their connections. The labels and connections are used to identify the different parts of the machine and how they interact with each other.

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UNLESS OTHERWISE NOTED 4.51V \pm 0.5V AND 0.1TA \pm 70°C

NOTE¹: When using the SAM with an MC 6807, the timing table of DRs is (obtained without the delay shown in the timing diagrams (unless the synchronizing process is necessary) the synchronizing process requires a maximum of 22 cycles of output for completion.

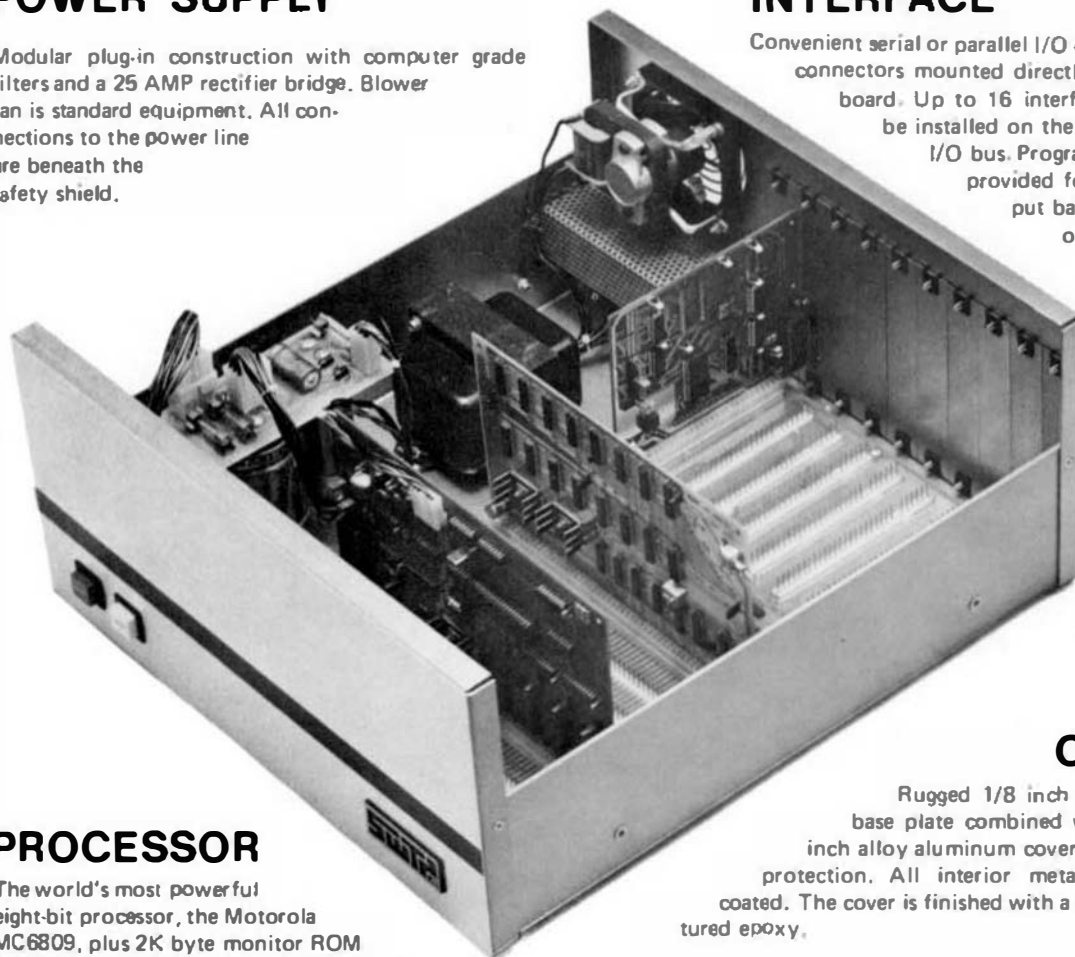
WE HAVE A 6809 FOR YOU

POWER SUPPLY

Modular plug-in construction with computer grade filters and a 25 AMP rectifier bridge. Blower fan is standard equipment. All connections to the power line are beneath the safety shield.

INTERFACE

Convenient serial or parallel I/O cards have DB-25 connectors mounted directly on the circuit board. Up to 16 interface devices may be installed on the address decoded I/O bus. Programming strips are provided for input and output baud rate selection on each port. All outputs are fully buffered.



PROCESSOR

The world's most powerful eight-bit processor, the Motorola MC6809, plus 2K byte monitor ROM that is 2716 EPROM compatible and full

buffering on all output lines. Built-in multiuser capability, just add I/O cards to operate a multi-terminal system.

CABINET

Rugged 1/8 inch alloy aluminum base plate combined with a solid 1/8 inch alloy aluminum cover for unsurpassed protection. All interior metal is conversion coated. The cover is finished with a super tough textured epoxy.

MEMORY— You can purchase the computer with either 8K bytes of RAM memory (expandable to 56K), or with the full 56K. The efficient, cool running dynamic memory used in this system is designed and manufactured for us by "Motorola Memory Systems Inc."

PERIPHERALS— The wide range of peripheral hardware that is supported by the 6809 includes: dot matrix printers (both 80 and 132 column), IBM Electronic 50 typewriter, daisy wheel printers, 5-inch floppy disk system, 8-inch floppy disk systems and a 16 megabyte hard disk.

SOFTWARE— The amount of software support available for the 6809 is incredible when you consider that it was first introduced in June, 1979. In addition to the FLEX9 operating system, we have a Text Editor, Mnemonic Assembler, Debug, Sort-Merge, BASIC, Extended BASIC, MultiUser BASIC, FORTRAN, PASCAL and PILOT.

69/K Computer Kit with 8K bytes of memory	\$ 495.00
69/A Assembled Computer with 8K bytes of memory	\$ 595.00
69/56 Assembled Computer with 56K bytes of memory	\$1,595.00



SOUTHWEST TECHNICAL PRODUCTS CORPORATION
219 W. RHAPSODY
SAN ANTONIO, TEXAS 78216 (512) 344-0241

6809 DISK SYSTEMS

All disk systems are supplied with our version of FLEX 9, the world standard disk operating system for the 6809. Our systems normally operate in double density format, but they are compatible with single density, or single sided recording formats. FLEX is supplied with over forty utilities, many of which are only available with our systems.

Our disk systems offer you mass storage at low cost. The cost per thousand bytes of storage for our various systems is shown in the chart. Other 6809 disk systems have costs up to three times greater for the same general type drive.

TYPE	CAPACITY	COST
D-5	720,000 bytes	\$1.80 per/K
DT-5	1,400,000 bytes	\$1.16 per/K
DMF-2	2,400,000 bytes	\$1.04 per/K
CDS-1	16,000,000 bytes	\$.27 per/K

D-5 Two double sided, double density, 5" disk drives with a total on line capacity of 720,000 bytes of data. Includes cabinet, power supply, connecting cable and controller. Controller will operate up to four drives. This is an ideal disk system for small stand alone word processing systems, or for businesses that do not work with large inventories.

14 x 6 x 10 — 20 lbs \$1,295.00

DT-5 Double track density version of the D-5. The DT-5 uses two 96 track per inch drives to provide an on line capacity of 1,400,000 bytes. Includes cabinet, power supply, connecting cable and controller. Controller will operate up to four drives. This is a disk system with enough capacity to include small inventories of up to 1,000 items, plus the usual business package of general ledger payroll, etc.

14 x 6 x 10 — 20 lbs \$1,695.00

DMF-2 Double sided, double density, dual eight-inch disk system with an on line capacity of 2,400,000 bytes. Our "top of the line" disk system features a DMA type controller for fastest possible data transfers. This drive was designed for larger businesses and multi user installations. The DMF-2 will provide the fast operation necessary for systems running multiterminals under the UniFLEX operating system. Complete with a heavy duty 1/8-inch metal cabinet, power supply, connecting cable and controller. The controller will operate up to four drives.

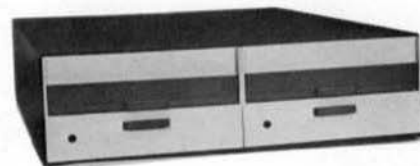
17½ x 5 x 21½ — 53 lbs \$2,495.00

CDS-1 This "Winchester" type hard disk provides both large storage capacity and high speed operation. The CDS-1 is the answer for systems that must handle large inventories or systems with more than four terminals. The controller has its own processor and uses DMA data transfer.

CDS-1 — 115 lbs \$4,395.00



D-5 or DT-5



DMF2



CDS-1



SOUTHWEST TECHNICAL PRODUCTS CORPORATION
219 W. RHAPSODY
SAN ANTONIO, TEXAS 78216 (512) 344-0241

S.A.M. - GENERAL DESCRIPTION

The S.A.M. is a 40 pin integrated circuit to be used with the MC6809 microprocessor unit (MPU), the MC6847 color video display generator (VDC) and up to 64K bytes of dynamic RAM.

As the name implies, the S.A.M. multiplexes the MC6809 addresses and the MC6847 addresses into eight dynamic RAM address pins. In addition, the S.A.M. provides complete system address decoding and timing (including \overline{RST} , \overline{CAS} and \overline{WE}). The S.A.M. provides clocks to the MC6809, MC6847 and the internal refresh counter in such a manner as to SYNCHRONIZE all three.

S.A.M. - PROGRAMMABILITY

The S.A.M. contains a 16 bit control register which allows the 6809 to program the S.A.M. for the following options:

VDC ADDRESSING MODE - 3 bits
VDC ADDRESS OFFSET -- 7 bits
DMA PAGE SWITCH ----- 1 bit
MPU RATE ----- 2 bits
MEMORY SIZE ----- 2 bits
MAP TYPE ----- 1 bit

Note that when the S.A.M. is reset by first applying power or by manual hardware reset, all control register bits are cleared (to a logic "0").

VDC ADDRESSING MODE

Three bits (V_2, V_1, V_0) control the sequence of DISPLAY ADDRESSES generated by the S.A.M. (which are used to scan dynamic RAM for video information). For example, if you wish to display dynamic RAM data as INTERNAL ALPHANUMERIC VIDEO, you should program the MC6847 for the INTERNAL ALPHANUMERIC MODE and CLEAR BITS V_2, V_1 and V_0 in the S.A.M. The table on the following page summarizes the available modes:

*In a "Sam computer", a PIA at location \$FF27 is used to control MC6847 modes. (See MC6847 Data Sheet.)

MPU RATE

Two bits (R_1, R_0) control the clock rate to the MC6809 MPU. The options are:

RATE (FREQUENCY OF "E" CLOCK)	R_1	R_0
0.3 MHz (CRYSTAL FREQUENCY $\pm 1\%$)	0	0
0.3/1.0 MHz (ADDRESS DEPENDENT RATE)	0	1
0.8 MHz (CRYSTAL FREQUENCY $\pm 1\%$)	1	1

(Typical Crystal Frequency = 10.31018 MHz)

In the "address dependent rate" mode, accesses to \$0000-\$FFFF and \$7F00-\$FFFF are slowed to 0.3 MHz and all other addresses are accessed at 0.8 MHz.

MEMORY SIZE*

Two bits (M_1 and M_0) determine RAM memory size. The options are:

SIZE	M_1	M_0
One or two banks of 4K x 1 dynamic RAMS	0	0
One or two banks of 16K x 1 dynamic RAMS	0	1
One bank of 64K x 1 dynamic RAMS	1	0
Up to 64K static RAM**	1	1

IMPORTANT

*Must be sure to program the S.A.M. for the correct memory size before using RAM (i.e., for a subroutine stack).

MAP TYPE*

One bit (TY) is used to select between two memory map configurations. The options are:

TYPE	TY
RAM: \$0000-\$FFF	
ROM: \$0000-\$FFF	1
I/O, VECTORS, SAM CONTROL REG.: \$FF00-\$FFFF	
RAM: \$0000-\$FFF	
I/O, VECTORS, ROM, SAM CONTROL REG.: \$FF00-\$FFFF	1

* Refer to Appendices A and B.

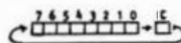
** Requires an extra latch for demultiplexing the RAM address.

WRITING TO THE S.A.M. CONTROL REGISTER

Any bit in the control register (C.R.) may be set by writing to a specific unique address. Each bit has two unique addresses... writing to the even address clears the bit and writing to the odd address sets the bit. (Note: the data bus is tri-state in this procedure.) The unique addresses are tabulated in Appendix A and Appendix B.

If desired, a short routine may be written to program the S.A.M. C.R. "word at a time". For example, the following routine copies "0" bits from "A" register to S.A.M. C.R. addresses beginning with address "0".

SAM1	A6	ROM A
24	06	OCC SAM1
30	01	EXX (LEAXI,X)
A7	00	STA 0,X ⁰
28	02	STRA SAM1
SAM2	A7	STA 0,X ⁰
SAM3	5A	DEC 0
26	F2	BRE SAM1
35		RTS



RMS dbms

Larry Kherlaty, Washington Computer Services

DBMS: WHAT AND WHY?

Everybody knows that computers can be programmed in BASIC or PASCAL or whatever to do all sorts of record keeping functions cheap. Right...? Wrong! We all watch in delight as computer power increases, and computer prices decrease. But, even though the hardware is ready for business, the software is not. The reason is simply that software is a labor-intensive product. And to make matters worse, the software laborer must be highly skilled, (and highly paid). Even the most efficient programmer is forced to wade through a forest of messy details just to get to the point where he can attack the particular problem at hand. Many a business system has been developed by brute force only to find that to alter it for day-to-day changes in the real world, or to modify it to fit another business, can be accomplished only by investing further amounts of costly programmer time. The solution to this problem lies in the application of the right software tools. RMS, a database management system, is such a tool.

The theory behind database management is that there is a fairly broad class of record keeping problems which all share certain common aspects. These common aspects are handled in a general way. Thus, when attacking a particular data handling problem, many of the tedious programming tasks that would otherwise need to be done just to get off the ground, are taken care of automatically by the DBMS. The common aspects of any computerized record keeping system are: 1) putting individual pieces of information into the database; 2) modifying the information in the database; 3) fetching information from the database on command; 4) re-arranging the information in the database, and; 5) producing printed reports from the database. As you know, all of these things can be accomplished by writing some programs to manipulate files. However, a set of such programs is NOT a database management system. With a database management system it is possible to perform all of these tasks without ever writing any programs. The user need only describe the data items that are to be managed; the DBMS takes care of the details. Record Management System (RMS) is a set of extremely efficient 6809 machine language programs that make up a versatile and understandable DBMS.

THE DATA DICTIONARY

To establish a database using RMS, the first step is to create a text file called a DICTIONARY. The dictionary is a description of the type(s) of RECORDS to be stored in the database. A record is a collection of FIELDS. Each field contains a particular data value. For example, a record might contain 4 fields: name, social security number, rate of pay and number of tax exemptions. Within the dictionary each field is given a name, a data type code and a length. Also included for each field is a prompt string. The prompt string is a descriptive message which will be used by RMS when displaying the record as a form on the CRT screen. Optionally, the dictionary may include restrictions on the values which are to be allowed in a field. For example, a field which is to contain a grade from a class might be restricted to values of A,B,C,D or F. The type code of the field also determines the particular data values that can be stored. The RMS field types are A(lphanumeric), N(umeric), M(oney) and D(ate).

To sum up the function of the dictionary file: it tells what fields are to be stored in each record of the database, it tells what type of data each field may store, it tells what values are allowed in each field, and it determines what the record will look like when displayed as a form to be filled out on the CRT screen. RMS allows a database in which every record has the same format; or a database with two types of records. In this case there are primary records (which all have the same format), and each primary record may own any number of secondary records. The format of the secondary records is different from that of the primary records. An example of this organization is a database with a primary record for each customer, with a secondary record for each of the customer's invoices.

The dictionary may be entered with any text editor as a text file with the suffix ".DIC".

INITIALIZING AN RMS DATABASE

Once the dictionary file is entered on disk, the RMSNEW program is used to create an "empty" database file with the appropriate characteristics. The user need only supply the maximum length record, and the maximum number of records to be stored in the database. The database file itself will be in standard text file format with fixed length records. Thus it is easy to access the database directly from user written BASIC, PASCAL, etc. programs. RMS itself uses "hash coding" to locate individual records in the file. Hash coding is simply a formulaic method of scattering the data records all over the file in such a manner as to allow extremely rapid access to any particular record if its key is known. The hash coding formula is explained and given as a BASIC subroutine in the RMS manual.

GETTING RECORDS IN AND OUT

The RMS record editor allows the operator to use the CRT screen as a window to the database. The screen will contain a form fill-out type of display that represents a record from the database. The user can add, change or delete records, look up information by record key, or browse through the file in random order or a specified order. RMS will insure that all data entered is valid for the type of field and for any restrictions placed on the field by the dictionary. This program serves the purpose of data entry, data validation, and online database access. RMS can look up any record in the database instantly and display it in the form on the screen. The form is made up of the prompt strings found in the data dictionary so it can look exactly as the implementor specifies. The cursor will come to rest only in places on the screen where the operator should type. It will not allow invalid data to be entered. The operator uses special function keys to move from field to field, enter data and cause records to be read or written to disk. As supplied RMS is configured for the SwTPC CT-82. However it is easy to re-configure it for most other types of CRT terminals.

GETTING PRINTED REPORTS

RMS includes a report writer facility. To use it you need only create a text file called a REPORT SPEC. The report spec is a few simple lines which tell what records from the file are to be printed, in what order they are to appear, and what the exact format of the printed output is to be. In general, the user will create many different report specs for the database. Each report spec will describe one of the printed reports to be produced on command. The following functions may be selected in any combination when creating a report spec: report title page; report wrap-up page; process records in any order; adjust to any page size; skip page

perforations; include or exclude records as determined by field values; page headers; complete control over print format including the ability to print any number of lines per record; field totaling and sub-totaling; record counting; system date and page numbering; control breaks; and record group-end summaries.

SORTING AND INDEXING

RMS also includes an indexing utility which can be used to create an index on any field within the records. This index can be used to drive the RMS record editor or the report writer. This gives the user complete control over the order of record processing. The index utility is essentially an efficient sort/merge which produces an ordered list of record keys. The output is in text file format so indexes can be accessed or even created by user-written BASIC programs.

REORGANIZING THE DATABASE

The RMSCOPY utility is used to move the contents of one database file to another. It can perform one or more of the following functions in the process: merge two database files; post a transaction database to master database; expand or contract a file; or change the field and/or record layout of a file. This means that if, after the database is in use, new fields need to be added to the file, it can be done by a simple dictionary change and RMSCOPY.

WHO CAN USE DBMS

Anyone who has a record-keeping function, be it accounting, customer lists, inventory, client control, student records or whatever, should consider the database management approach. It will normally be the most efficient route to a working system. And it will produce a system which can change to keep up with changing requirements. With RMS even the relative novice can implement a sophisticated database management system that is custom tailored to his specific needs. The experienced programmer can use RMS to leap far ahead in system implementation, skipping over many hours of unnecessary programming to do the common tasks that every system needs. His time can be spent directly on the programs that perform the unique processing of the particular system.

RMS is available for a 6809 Flex-based system from Washington Computer Services, 3028 Silvern Lane, Bellingham WA 98225. It is also available from Southwest Technical Products Corporation.

STUDENT Grade

'JW' stands for 'John Wood', the founder of Quincy, IL, and the namesake of one of the most innovative Community Colleges in America. 'JWCC' (as it is known) has teamed up with Harris Corp., one of the world's leading manufacturers of broadcast equipment, to provide a 2 year Associate Degree program in Broadcast Engineering Technology.

Students take support courses such as Math and English at local colleges, but the core courses are taught inside the Harris plant, where they have access to the same state of the art equipment (such as Spectrum Analyzers, Logic Analyzers, etc., as is used on the 'front line'.

The Harris Instructional Staff never get behind

This series of programs, written in TSC's X BASIC on a SWTPC 69A with 40 K of memory, was designed to take the drudgery out of keeping up with the grades for the John Wood students. With this series of programs a class roster can be created, and then added to or otherwise edited. After every editing job, the file is sorted in alphabetical order. The SCORE program grades a multiple-choice test. It call the roster for the class, asks you whether the student was present or absent, the questions missed, and for a personal code number known only to the student. (It is illegal to post grades by name or even by Social Security #, but grades can be posted by a personal code)

The test grades are listed in three categories: 'raw', which is the actual grade, 'percentile', which is the 'normalizing' procedure to rank a student as to where he stands in relation to the mythical 'average' on ye olde bell-shaped-curve (the top of the curve=50), and the final classification is 'adjusted' which just shifts the bell curve upwards to where the top of the curve is at 75. (Students don't like to be called '50', but '75' they can live with.

The ISSUE program prints out a mailing list from the CLASS program, pulls the grades for each student, and gives a status report that can be mailed to each student.

I plan to put each item on a disk file, and each time a test is graded, the results will be added to the file. In the future I will be able to pick out which items I want and have the computer print me out a test. In fact, I will be able to specify a class average and have the computer pick my items that are most likely to give me that average. (If the class gets too cocky, for instance, and think they are hot-shots...I can always pull them down a peg or two.)

Martin J Petersen, Jr
327 Elm Street
Quincy, Illinois 62301
(217)-224-6108

Senior Broadcast Technology Instructor
Harris Corporation
Quincy, Illinois 62301
(217)-222-8200

[illegible]

[illegible]

BIT Bucket

Peter F. Hill
Box 196
Somerset, Ca 95684
916-626-0749

September 2, 1980

Mr. Don Williams
68 Micro Journal
1016 Hamill Rd
PO Box 649
Hickson, TN 37343

Dear Mr. Williams:

I have been a subscriber of yours since the beginning of this year, and would like to commend you for the fine job you have done. I have gotten a lot of useful information out of '68' Micro Journal. Ron Anderson's PLEX USER NOTES have been particularly helpful, since I am a newcomer to PLEX.

I have put together an 8-100 uscan system consisting of:
Microdays 6800 CPU board
48K RAM
SD Systems Versatloppy I
SEM PBI Prom Programmer
Integrand Mainframe
2 Motorola 652 Drives, modified to look like Snuggatts
Heseltine 1500 Terminal
Cume S3/45 Printer
RISC custom interfaces, including a 19.2 kbaud serial link to another homebrew computer using PACE.
PLEX V 2.0 GENERAL for 6809, customized to the hardware.

For your information, I do not recommend the use of the Microdays board. It is not 5100 compatible without extensive modifications, and is in general not well thought out. The SEM Prom programmer is O.K. for 8080/80 out not for 6809, as it uses wait states for timing. The Versatloppy is excellent and well documented. PLEX is terrific! The documentation for the general version is very complete, and seems customization very straightforward.

I have since received a 6809 CPU board from Acherman Digital Systems which looks good, but have not tried it out yet.

I have followed with some amusement the chauvinistic discourses in your publication regarding the advantages of the S-50 bus over the S-100. Let me just say that I made my decision to go with S-100 for one simple reason: it would allow me to run both 6809 and 280 in the same mainframe, using off the shelf hardware. This is important to me in my work, as my clients often dictate which processor must be used in their systems. It turns out that I was pretty naive regarding that "off the shelf" part, but I still think I made the right decision. In fact, the only thing I question is whether I should have even bothered with 6809 for a while. Consider: Motorola still doesn't have a decent User's Manual. The Price of 6809 chips is still high. Software is still scant. I have ordered the STRATUS 6809 processor from Sonex Systems, but I'm not sure it will support proportional printing, bidirectional printing or if it will in fact interface with my printer. I have also installed the 6809 ROM7H version distributed by the forth interest group, but haven't learned how to use it yet.

I do see some hope for the future, as usage of the 6809 increases. The processor itself has obvious advantages.

I hope I haven't offended anyone by my comments; I just wanted to deliver an honest opinion.

Sincerely

Peter F. Hill

Peter F. Hill

Editor's Note:

Pete: Thanks first for the nice compliments concerning 68 Micro Journal, never get tired of receiving them.

We have also heard grumbings about the MicroSys 6809 CPU board. It is unfortunate but there has been practically no support for that type of configuration. Most all 68XX support is geared to the S50 bus. I personally know many who run 68XX devices on backplanes other than the S50; however, most spend more time getting everything together rather than operating. For many this is the 'fun' of the thing, for others it is a pile of worms. I guess that our 'chauvinistic' leanings are due to our desire to chug along with as little hassle as possible, i.e., S50 bus. Of course the Z80 has been mated to the S50 bus (we have one) but then it is a can of worms for us...no support!

I know also many 'consultants' who sell their services using both the 68XX and 80XX devices. Seems that the best route is a separate backplane for each. However, I know of NO application using a 80XX device that is more efficient or cost effective than the same using a 68XX.

```
5200 PRINT#0:PRINT#1:PRINT#2:PRINT#3:PRINT#4:PRINT#5:PRINT#6:PRINT#7:PRINT#8:PRINT#9:PRINT#10:PRINT#11:PRINT#12:PRINT#13:PRINT#14:PRINT#15:PRINT#16:PRINT#17:PRINT#18:PRINT#19:PRINT#20:PRINT#21:PRINT#22:PRINT#23:PRINT#24:PRINT#25:PRINT#26:PRINT#27:PRINT#28:PRINT#29:PRINT#30:PRINT#31:PRINT#32:PRINT#33:PRINT#34:PRINT#35:PRINT#36:PRINT#37:PRINT#38:PRINT#39:PRINT#40:PRINT#41:PRINT#42:PRINT#43:PRINT#44:PRINT#45:PRINT#46:PRINT#47:PRINT#48:PRINT#49:PRINT#50:PRINT#51:PRINT#52:PRINT#53:PRINT#54:PRINT#55:PRINT#56:PRINT#57:PRINT#58:PRINT#59:PRINT#60:PRINT#61:PRINT#62:PRINT#63:PRINT#64:PRINT#65:PRINT#66:PRINT#67:PRINT#68:PRINT#69:PRINT#70:PRINT#71:PRINT#72:PRINT#73:PRINT#74:PRINT#75:PRINT#76:PRINT#77:PRINT#78:PRINT#79:PRINT#80:PRINT#81:PRINT#82:PRINT#83:PRINT#84:PRINT#85:PRINT#86:PRINT#87:PRINT#88:PRINT#89:PRINT#90:PRINT#91:PRINT#92:PRINT#93:PRINT#94:PRINT#95:PRINT#96:PRINT#97:PRINT#98:PRINT#99:PRINT#100:PRINT#101:PRINT#102:PRINT#103:PRINT#104:PRINT#105:PRINT#106:PRINT#107:PRINT#108:PRINT#109:PRINT#110:PRINT#111:PRINT#112:PRINT#113:PRINT#114:PRINT#115:PRINT#116:PRINT#117:PRINT#118:PRINT#119:PRINT#120:PRINT#121:PRINT#122:PRINT#123:PRINT#124:PRINT#125:PRINT#126:PRINT#127:PRINT#128:PRINT#129:PRINT#130:PRINT#131:PRINT#132:PRINT#133:PRINT#134:PRINT#135:PRINT#136:PRINT#137:PRINT#138:PRINT#139:PRINT#140:PRINT#141:PRINT#142:PRINT#143:PRINT#144:PRINT#145:PRINT#146:PRINT#147:PRINT#148:PRINT#149:PRINT#150:PRINT#151:PRINT#152:PRINT#153:PRINT#154:PRINT#155:PRINT#156:PRINT#157:PRINT#158:PRINT#159:PRINT#160:PRINT#161:PRINT#162:PRINT#163:PRINT#164:PRINT#165:PRINT#166:PRINT#167:PRINT#168:PRINT#169:PRINT#170:PRINT#171:PRINT#172:PRINT#173:PRINT#174:PRINT#175:PRINT#176:PRINT#177:PRINT#178:PRINT#179:PRINT#180:PRINT#181:PRINT#182:PRINT#183:PRINT#184:PRINT#185:PRINT#186:PRINT#187:PRINT#188:PRINT#189:PRINT#190:PRINT#191:PRINT#192:PRINT#193:PRINT#194:PRINT#195:PRINT#196:PRINT#197:PRINT#198:PRINT#199:PRINT#200:PRINT#201:PRINT#202:PRINT#203:PRINT#204:PRINT#205:PRINT#206:PRINT#207:PRINT#208:PRINT#209:PRINT#210:PRINT#211:PRINT#212:PRINT#213:PRINT#214:PRINT#215:PRINT#216:PRINT#217:PRINT#218:PRINT#219:PRINT#220:PRINT#221:PRINT#222:PRINT#223:PRINT#224:PRINT#225:PRINT#226:PRINT#227:PRINT#228:PRINT#229:PRINT#230:PRINT#231:PRINT#232:PRINT#233:PRINT#234:PRINT#235:PRINT#236:PRINT#237:PRINT#238:PRINT#239:PRINT#240:PRINT#241:PRINT#242:PRINT#243:PRINT#244:PRINT#245:PRINT#246:PRINT#247:PRINT#248:PRINT#249:PRINT#250:PRINT#251:PRINT#252:PRINT#253:PRINT#254:PRINT#255:PRINT#256:PRINT#257:PRINT#258:PRINT#259:PRINT#260:PRINT#261:PRINT#262:PRINT#263:PRINT#264:PRINT#265:PRINT#266:PRINT#267:PRINT#268:PRINT#269:PRINT#270:PRINT#271:PRINT#272:PRINT#273:PRINT#274:PRINT#275:PRINT#276:PRINT#277:PRINT#278:PRINT#279:PRINT#280:PRINT#281:PRINT#282:PRINT#283:PRINT#284:PRINT#285:PRINT#286:PRINT#287:PRINT#288:PRINT#289:PRINT#290:PRINT#291:PRINT#292:PRINT#293:PRINT#294:PRINT#295:PRINT#296:PRINT#297:PRINT#298:PRINT#299:PRINT#300:PRINT#301:PRINT#302:PRINT#303:PRINT#304:PRINT#305:PRINT#306:PRINT#307:PRINT#308:PRINT#309:PRINT#310:PRINT#311:PRINT#312:PRINT#313:PRINT#314:PRINT#315:PRINT#316:PRINT#317:PRINT#318:PRINT#319:PRINT#320:PRINT#321:PRINT#322:PRINT#323:PRINT#324:PRINT#325:PRINT#326:PRINT#327:PRINT#328:PRINT#329:PRINT#330:PRINT#331:PRINT#332:PRINT#333:PRINT#334:PRINT#335:PRINT#336:PRINT#337:PRINT#338:PRINT#339:PRINT#340:PRINT#341:PRINT#342:PRINT#343:PRINT#344:PRINT#345:PRINT#346:PRINT#347:PRINT#348:PRINT#349:PRINT#350:PRINT#351:PRINT#352:PRINT#353:PRINT#354:PRINT#355:PRINT#356:PRINT#357:PRINT#358:PRINT#359:PRINT#360:PRINT#361:PRINT#362:PRINT#363:PRINT#364:PRINT#365:PRINT#366:PRINT#367:PRINT#368:PRINT#369:PRINT#370:PRINT#371:PRINT#372:PRINT#373:PRINT#374:PRINT#375:PRINT#376:PRINT#377:PRINT#378:PRINT#379:PRINT#380:PRINT#381:PRINT#382:PRINT#383:PRINT#384:PRINT#385:PRINT#386:PRINT#387:PRINT#388:PRINT#389:PRINT#390:PRINT#391:PRINT#392:PRINT#393:PRINT#394:PRINT#395:PRINT#396:PRINT#397:PRINT#398:PRINT#399:PRINT#400:PRINT#401:PRINT#402:PRINT#403:PRINT#404:PRINT#405:PRINT#406:PRINT#407:PRINT#408:PRINT#409:PRINT#410:PRINT#411:PRINT#412:PRINT#413:PRINT#414:PRINT#415:PRINT#416:PRINT#417:PRINT#418:PRINT#419:PRINT#420:PRINT#421:PRINT#422:PRINT#423:PRINT#424:PRINT#425:PRINT#426:PRINT#427:PRINT#428:PRINT#429:PRINT#430:PRINT#431:PRINT#432:PRINT#433:PRINT#434:PRINT#435:PRINT#436:PRINT#437:PRINT#438:PRINT#439:PRINT#440:PRINT#441:PRINT#442:PRINT#443:PRINT#444:PRINT#445:PRINT#446:PRINT#447:PRINT#448:PRINT#449:PRINT#450:PRINT#451:PRINT#452:PRINT#453:PRINT#454:PRINT#455:PRINT#456:PRINT#457:PRINT#458:PRINT#459:PRINT#460:PRINT#461:PRINT#462:PRINT#463:PRINT#464:PRINT#465:PRINT#466:PRINT#467:PRINT#468:PRINT#469:PRINT#470:PRINT#471:PRINT#472:PRINT#473:PRINT#474:PRINT#475:PRINT#476:PRINT#477:PRINT#478:PRINT#479:PRINT#480:PRINT#481:PRINT#482:PRINT#483:PRINT#484:PRINT#485:PRINT#486:PRINT#487:PRINT#488:PRINT#489:PRINT#490:PRINT#491:PRINT#492:PRINT#493:PRINT#494:PRINT#495:PRINT#496:PRINT#497:PRINT#498:PRINT#499:PRINT#500:PRINT#501:PRINT#502:PRINT#503:PRINT#504:PRINT#505:PRINT#506:PRINT#507:PRINT#508:PRINT#509:PRINT#510:PRINT#511:PRINT#512:PRINT#513:PRINT#514:PRINT#515:PRINT#516:PRINT#517:PRINT#518:PRINT#519:PRINT#520:PRINT#521:PRINT#522:PRINT#523:PRINT#524:PRINT#525:PRINT#526:PRINT#527:PRINT#528:PRINT#529:PRINT#530:PRINT#531:PRINT#532:PRINT#533:PRINT#534:PRINT#535:PRINT#536:PRINT#537:PRINT#538:PRINT#539:PRINT#540:PRINT#541:PRINT#542:PRINT#543:PRINT#544:PRINT#545:PRINT#546:PRINT#547:PRINT#548:PRINT#549:PRINT#550:PRINT#551:PRINT#552:PRINT#553:PRINT#554:PRINT#555:PRINT#556:PRINT#557:PRINT#558:PRINT#559:PRINT#560:PRINT#561:PRINT#562:PRINT#563:PRINT#564:PRINT#565:PRINT#566:PRINT#567:PRINT#568:PRINT#569:PRINT#570:PRINT#571:PRINT#572:PRINT#573:PRINT#574:PRINT#575:PRINT#576:PRINT#577:PRINT#578:PRINT#579:PRINT#580:PRINT#581:PRINT#582:PRINT#583:PRINT#584:PRINT#585:PRINT#586:PRINT#587:PRINT#588:PRINT#589:PRINT#590:PRINT#591:PRINT#592:PRINT#593:PRINT#594:PRINT#595:PRINT#596:PRINT#597:PRINT#598:PRINT#599:PRINT#600:PRINT#601:PRINT#602:PRINT#603:PRINT#604:PRINT#605:PRINT#606:PRINT#607:PRINT#608:PRINT#609:PRINT#610:PRINT#611:PRINT#612:PRINT#613:PRINT#614:PRINT#615:PRINT#616:PRINT#617:PRINT#618:PRINT#619:PRINT#620:PRINT#621:PRINT#622:PRINT#623:PRINT#624:PRINT#625:PRINT#626:PRINT#627:PRINT#628:PRINT#629:PRINT#630:PRINT#631:PRINT#632:PRINT#633:PRINT#634:PRINT#635:PRINT#636:PRINT#637:PRINT#638:PRINT#639:PRINT#640:PRINT#641:PRINT#642:PRINT#643:PRINT#644:PRINT#645:PRINT#646:PRINT#647:PRINT#648:PRINT#649:PRINT#650:PRINT#651:PRINT#652:PRINT#653:PRINT#654:PRINT#655:PRINT#656:PRINT#657:PRINT#658:PRINT#659:PRINT#660:PRINT#661:PRINT#662:PRINT#663:PRINT#664:PRINT#665:PRINT#666:PRINT#667:PRINT#668:PRINT#669:PRINT#670:PRINT#671:PRINT#672:PRINT#673:PRINT#674:PRINT#675:PRINT#676:PRINT#677:PRINT#678:PRINT#679:PRINT#680:PRINT#681:PRINT#682:PRINT#683:PRINT#684:PRINT#685:PRINT#686:PRINT#687:PRINT#688:PRINT#689:PRINT#690:PRINT#691:PRINT#692:PRINT#693:PRINT#694:PRINT#695:PRINT#696:PRINT#697:PRINT#698:PRINT#699:PRINT#700:PRINT#701:PRINT#702:PRINT#703:PRINT#704:PRINT#705:PRINT#706:PRINT#707:PRINT#708:PRINT#709:PRINT#710:PRINT#711:PRINT#712:PRINT#713:PRINT#714:PRINT#715:PRINT#716:PRINT#717:PRINT#718:PRINT#719:PRINT#720:PRINT#721:PRINT#722:PRINT#723:PRINT#724:PRINT#725:PRINT#726:PRINT#727:PRINT#728:PRINT#729:PRINT#730:PRINT#731:PRINT#732:PRINT#733:PRINT#734:PRINT#735:PRINT#736:PRINT#737:PRINT#738:PRINT#739:PRINT#740:PRINT#741:PRINT#742:PRINT#743:PRINT#744:PRINT#745:PRINT#746:PRINT#747:PRINT#748:PRINT#749:PRINT#750:PRINT#751:PRINT#752:PRINT#753:PRINT#754:PRINT#755:PRINT#756:PRINT#757:PRINT#758:PRINT#759:PRINT#760:PRINT#761:PRINT#762:PRINT#763:PRINT#764:PRINT#765:PRINT#766:PRINT#767:PRINT#768:PRINT#769:PRINT#770:PRINT#771:PRINT#772:PRINT#773:PRINT#774:PRINT#775:PRINT#776:PRINT#777:PRINT#778:PRINT#779:PRINT#780:PRINT#781:PRINT#782:PRINT#783:PRINT#784:PRINT#785:PRINT#786:PRINT#787:PRINT#788:PRINT#789:PRINT#790:PRINT#791:PRINT#792:PRINT#793:PRINT#794:PRINT#795:PRINT#796:PRINT#797:PRINT#798:PRINT#799:PRINT#800:PRINT#801:PRINT#802:PRINT#803:PRINT#804:PRINT#805:PRINT#806:PRINT#807:PRINT#808:PRINT#809:PRINT#810:PRINT#811:PRINT#812:PRINT#813:PRINT#814:PRINT#815:PRINT#816:PRINT#817:PRINT#818:PRINT#819:PRINT#820:PRINT#821:PRINT#822:PRINT#823:PRINT#824:PRINT#825:PRINT#826:PRINT#827:PRINT#828:PRINT#829:PRINT#830:PRINT#831:PRINT#832:PRINT#833:PRINT#834:PRINT#835:PRINT#836:PRINT#837:PRINT#838:PRINT#839:PRINT#840:PRINT#841:PRINT#842:PRINT#843:PRINT#844:PRINT#845:PRINT#846:PRINT#847:PRINT#848:PRINT#849:PRINT#850:PRINT#851:PRINT#852:PRINT#853:PRINT#854:PRINT#855:PRINT#856:PRINT#857:PRINT#858:PRINT#859:PRINT#860:PRINT#861:PRINT#862:PRINT#863:PRINT#864:PRINT#865:PRINT#866:PRINT#867:PRINT#868:PRINT#869:PRINT#870:PRINT#871:PRINT#872:PRINT#873:PRINT#874:PRINT#875:PRINT#876:PRINT#877:PRINT#878:PRINT#879:PRINT#880:PRINT#881:PRINT#882:PRINT#883:PRINT#884:PRINT#885:PRINT#886:PRINT#887:PRINT#888:PRINT#889:PRINT#890:PRINT#891:PRINT#892:PRINT#893:PRINT#894:PRINT#895:PRINT#896:PRINT#897:PRINT#898:PRINT#899:PRINT#900:PRINT#901:PRINT#902:PRINT#903:PRINT#904:PRINT#905:PRINT#906:PRINT#907:PRINT#908:PRINT#909:PRINT#910:PRINT#911:PRINT#912:PRINT#913:PRINT#914:PRINT#915:PRINT#916:PRINT#917:PRINT#918:PRINT#919:PRINT#920:PRINT#921:PRINT#922:PRINT#923:PRINT#924:PRINT#925:PRINT#926:PRINT#927:PRINT#928:PRINT#929:PRINT#930:PRINT#931:PRINT#932:PRINT#933:PRINT#934:PRINT#935:PRINT#936:PRINT#937:PRINT#938:PRINT#939:PRINT#940:PRINT#941:PRINT#942:PRINT#943:PRINT#944:PRINT#945:PRINT#946:PRINT#947:PRINT#948:PRINT#949:PRINT#950:PRINT#951:PRINT#952:PRINT#953:PRINT#954:PRINT#955:PRINT#956:PRINT#957:PRINT#958:PRINT#959:PRINT#960:PRINT#961:PRINT#962:PRINT#963:PRINT#964:PRINT#965:PRINT#966:PRINT#967:PRINT#968:PRINT#969:PRINT#970:PRINT#971:PRINT#972:PRINT#973:PRINT#974:PRINT#975:PRINT#976:PRINT#977:PRINT#978:PRINT#979:PRINT#980:PRINT#981:PRINT#982:PRINT#983:PRINT#984:PRINT#985:PRINT#986:PRINT#987:PRINT#988:PRINT#989:PRINT#990:PRINT#991:PRINT#992:PRINT#993:PRINT#994:PRINT#995:PRINT#996:PRINT#997:PRINT#998:PRINT#999:PRINT#1000:PRINT#1001:PRINT#1002:PRINT#1003:PRINT#1004:PRINT#1005:PRINT#1006:PRINT#1007:PRINT#1008:PRINT#1009:PRINT#1010:PRINT#1011:PRINT#1012:PRINT#1013:PRINT#1014:PRINT#1015:PRINT#1016:PRINT#1017:PRINT#1018:PRINT#1019:PRINT#1020:PRINT#1021:PRINT#1022:PRINT#1023:PRINT#1024:PRINT#1025:PRINT#1026:PRINT#1027:PRINT#1028:PRINT#1029:PRINT#1030:PRINT#1031:PRINT#1032:PRINT#1033:PRINT#1034:PRINT#1035:PRINT#1036:PRINT#1037:PRINT#1038:PRINT#1039:PRINT#1040:PRINT#1041:PRINT#1042:PRINT#1043:PRINT#1044:PRINT#1045:PRINT#1046:PRINT#1047:PRINT#1048:PRINT#1049:PRINT#1050:PRINT#1051:PRINT#1052:PRINT#1053:PRINT#1054:PRINT#1055:PRINT#1056:PRINT#1057:PRINT#1058:PRINT#1059:PRINT#1060:PRINT#1061:PRINT#1062:PRINT#1063:PRINT#1064:PRINT#1065:PRINT#1066:PRINT#1067:PRINT#1068:PRINT#1069:PRINT#1070:PRINT#1071:PRINT#1072:PRINT#1073:PRINT#1074:PRINT#1075:PRINT#1076:PRINT#1077:PRINT#1078:PRINT#1079:PRINT#1080:PRINT#1081:PRINT#1082:PRINT#1083:PRINT#1084:PRINT#1085:PRINT#1086:PRINT#1087:PRINT#1088:PRINT#1089:PRINT#1090:PRINT#1091:PRINT#1092:PRINT#1093:PRINT#1094:PRINT#1095:PRINT#1096:PRINT#1097:PRINT#1098:PRINT#1099:PRINT#1100:PRINT#1101:PRINT#1102:PRINT#1103:PRINT#1104:PRINT#1105:PRINT#1106:PRINT#1107:PRINT#1108:PRINT#1109:PRINT#1110:PRINT#1111:PRINT#1112:PRINT#1113:PRINT#1114:PRINT#1115:PRINT#1116:PRINT#1117:PRINT#1118:PRINT#1119:PRINT#1120:PRINT#1121:PRINT#1122:PRINT#1123:PRINT#1124:PRINT#1125:PRINT#1126:PRINT#1127:PRINT#1128:PRINT#1129:PRINT#1130:PRINT#1131:PRINT#1132:PRINT#1133:PRINT#1134:PRINT#1135:PRINT#1136:PRINT#1137:PRINT#1138:PRINT#1139:PRINT#1140:PRINT#1141:PRINT#1142:PRINT#1143:PRINT#1144:PRINT#1145:PRINT#1146:PRINT#1147:PRINT#1148:PRINT#1149:PRINT#1150:PRINT#1151:PRINT#1152:PRINT#1153:PRINT#1154:PRINT#1155:PRINT#1156:PRINT#1157:PRINT#1158:PRINT#1159:PRINT#1160:PRINT#1161:PRINT#1162:PRINT#1163:PRINT#1164:PRINT#1165:PRINT#1166:PRINT#1167:PRINT#1168:PRINT#1169:PRINT#1170:PRINT#1171:PRINT#1172:PRINT#1173:PRINT#1174:PRINT#1175:PRINT#1176:PRINT#1177:PRINT#1178:PRINT#1179:PRINT#1180:PRINT#1181:PRINT#1182:PRINT#1183:PRINT#1184:PRINT#1185:PRINT#1186:PRINT#1187:PRINT#1188:PRINT#1189:PRINT#1190:PRINT#1191:PRINT#1192:PRINT#1193:PRINT#1194:PRINT#1195:PRINT#1196:PRINT#1197:PRINT#1198:PRINT#1199:PRINT#1200:PRINT#1201:PRINT#1202:PRINT#1203:PRINT#1204:PRINT#1205:PRINT#1206:PRINT#1207:PRINT#1208:PRINT#1209:PRINT#1210:PRINT#1211:PRINT#1212:PRINT#1213:PRINT#1214:PRINT#1215:PRINT#1216:PRINT#1217:PRINT#1218:PRINT#1219:PRINT#1220:PRINT#1221:PRINT#1222:PRINT#1223:PRINT#1224:PRINT#1225:PRINT#1226:PRINT#1227:PRINT#1228:PRINT#1229:PRINT#1230:PRINT#1231:PRINT#1232:PRINT#1233:PRINT#1234:PRINT#1235:PRINT#1236:PRINT#1237:PRINT#1238:PRINT#1239:PRINT#1240:PRINT#1241:PRINT#1242:PRINT#1243:PRINT#1244:PRINT#1245:PRINT#1246:PRINT#1247:PRINT#1248:PRINT#1249:PRINT#1250:PRINT#1251:PRINT#1252:PRINT#1253:PRINT#1254:PRINT#1255:PRINT#1256:PRINT#1257:PRINT#1258:PRINT#1259:PRINT#1260:PRINT#1261:PRINT#1262:PRINT#1263:PRINT#1264:PRINT#1265:PRINT#1266:PRINT#1267:PRINT#1268:PRINT#1269:PRINT#1270:PRINT#1271:PRINT#1272:PRINT#1273:PRINT#1274:PRINT#1275:PRINT#1276:PRINT#1277:PRINT#1278:PRINT#1279:PRINT#1280:PRINT#1281:PRINT#1282:PRINT#1283:PRINT#1284:PRINT#1285:PRINT#1286:PRINT#1287:PRINT#1288:PRINT#1289:PRINT#1290:PRINT#1291:PRINT#1292:PRINT#1293:PRINT#1294:PRINT#1295:PRINT#1296:PRINT#1297:PRINT#1298:PRINT#1299:PRINT#1300:PRINT#1301:PRINT#1302:PRINT#1303:PRINT#1304:PRINT#1305:PRINT#1306:PRINT#1307:PRINT#1308:PRINT#1309:PRINT#1310:PRINT#1311:PRINT#1312:PRINT#1313:PRINT#1314:PRINT#1315:PRINT#1316:PRINT#1317:PRINT#1318:PRINT#1319:PRINT#1320:PRINT#1321:PRINT#1322:PRINT#1323:PRINT#1324:PRINT#1325:PRINT#1326:PRINT#1327:PRINT#1328:PRINT#1329:PRINT#1330:PRINT#1331:PRINT#1332:PRINT#1333:PRINT#1334:PRINT#1335:PRINT#1336:PRINT#1337:PRINT#1338:PRINT#1339:PRINT#1340:PRINT#1341:PRINT#1342:PRINT#1343:PRINT#1344:PRINT#1345:PRINT#1346:PRINT#1347:PRINT#1348:PRINT#1349:PRINT#1350:PRINT#1351:PRINT#1352:PRINT#1353:PRINT#1354:PRINT#1355:PRINT#1356:PRINT#1357:PRINT#1358:PRINT#1359:PRINT#1360:PRINT#1361:PRINT#1362:PRINT#1363:PRINT#1364:PRINT#1365:PRINT#1366:PRINT#1367:PRINT#1368:PRINT#1369:PRINT#1370:PRINT#1371:PRINT#1372:PRINT#1373:PRINT#1374:PRINT#1375:PRINT#1376:PRINT#1377:PRINT#1378:PRINT#1379:PRINT#1380:PRINT#1381:PRINT#1382:PRINT#1383:PRINT#1384:PRINT#1385:PRINT#1386:PRINT#1387:PRINT#1388:PRINT#1389:PRINT#1390:PRINT#1391:PRINT#1392:PRINT#1393:PRINT#1394:PRINT#1395:PRINT#1396:PRINT#1397:PRINT#1398:PRINT#1399:PRINT#1400:PRINT#1401:PRINT#1402:PRINT#1403:PRINT#1404:PRINT#1405:PRINT#1406:PRINT#1407:PRINT#1408:PRINT#1409:PRINT#1410:PRINT#1411:PRINT#1412:PRINT#1413:PRINT#1414:PRINT#1415:PRINT#1416:PRINT#1417:PRINT#1418:PRINT#1419:PRINT#1420:PRINT#1421:PRINT#1422:PRINT#1423:PRINT#1424:PRINT#1425:PRINT#1426:PRINT#1427:PRINT#1428:PRINT#1429:PRINT#1430:PRINT#1431:PRINT#1432:PRINT#1433:PRINT#1434:PRINT#1435:PRINT#1436:PRINT#1437:PRINT#1438:PRINT#1439:PRINT#1440:PRINT#1441:PRINT#1442:PRINT#1443:PRINT#1444:PRINT#1445:PRINT#1446:PRINT#1447:PRINT#1448:PRINT#1449:PRINT#1450:PRINT#1451:PRINT#1452:PRINT#1453:PRINT#1454:PRINT#1455:PRINT#1456:PRINT#1457:PRINT#1458:PRINT#1459:PRINT#1460:PRINT#1461:PRINT#1462:PRINT#1463:PRINT#1464:PRINT#1465:PRINT#1466:PRINT#1467:PRINT#1468:PRINT#1469:PRINT#1470:PRINT#1471:PRINT#1472:PRINT#1473:PRINT#1474:PRINT#1475:PRINT#1476:PRINT#1477:PRINT#1478:PRINT#1479:PRINT#1480:PRINT#1481:PRINT#1482:PRINT#1483:PRINT#1484:PRINT#1485:PRINT#1486:PRINT#1487:PRINT#1488:PRINT#1489:PRINT#1490:PRINT#1491:PRINT#1492:PRINT#1493:PRINT#1494:PRINT#1495:PRINT#1496:PRINT#1497:PRINT#1498:PRINT#1499:PRINT#1500:PRINT#1501:PRINT#1502:PRINT#1503:PRINT#1504:PRINT#1505:PRINT#1506:PRINT#1507:PRINT#1508:PRINT#1509:PRINT#1510:PRINT#1511:PRINT#1512:PRINT#1513:PRINT#1514:PRINT#1515:PRINT#1516:PRINT#1517:PRINT#1518:PRINT#1519:PRINT#1520:PRINT#1521:PRINT#1522:PRINT#1523:PRINT#1524:PRINT#1525:PRINT#1526:PRINT#1527:PRINT#1528:PRINT#1529:PRINT#1530:PRINT#1531:PRINT#1532:PRINT#1533:PRINT#1534:PRINT#1535:PRINT#1536:PRINT#1537:PRINT#1538:PRINT#1539:PRINT#1540:PRINT#1541:PRINT#1542:PRINT#1543:PRINT#1544:PRINT#1545:PRINT#1546:PRINT#1547:PRINT#1548:PRINT#1549:PRINT#1550:PRINT#1551:PRINT#1552:PRINT#1553:PRINT#1554:PRINT#1555:PRINT#1556:PRINT#1557:PRINT#1558:PRINT#1559:PRINT#1560:PRINT#1561:PRINT#1562:PRINT#1563:PRINT#1564:PRINT#1565:PRINT#1566:PRINT#1567:PRINT#1568:PRINT#1569:PRINT#1570:PRINT#1571:PRINT#1572:PRINT#1573:PRINT#1574:PRINT#1575:PRINT#1576:PRINT#1577:PRINT#1578:PRINT#1579:PRINT#1580:PRINT#1581:PRINT#1582:PRINT#1583:PRINT#1584:PRINT#1585:PRINT#1586:PRINT#1587:PRINT#1588:PRINT#1589:PRINT#1590:PRINT#1591:PRINT#1592:PRINT#1593:PRINT#1594:PRINT#1595:PRINT#1596:PRINT#1597:PRINT#1598:PRINT#1599:PRINT#1600:PRINT#1601:PRINT#1602:PRINT#1603:PRINT#1604:PRINT#1605:PRINT#1606:PRINT#1607:PRINT#1608:PRINT#1609:PRINT#1610:PRINT#1611:PRINT#1612:PRINT#1613:PRINT#1614:PRINT#1615:PRINT#1616:PRINT#1617:PRINT#1618:PRINT#1619:PRINT#1620:PRINT#1621:PRINT#1622:PRINT#1623:PRINT#1624:PRINT#1625:PRINT#1626:PRINT#1627:PRINT#1628:PRINT#1629:PRINT#1630:PRINT#1631:PRINT#1632:PRINT#1633:PRINT#1634:PRINT#1635:PRINT#1636:PRINT#1637:PRINT#1638:PRINT#1639:PRINT#1640:PRINT#1641:PRINT#1642:PRINT#1643:PRINT#1644:PRINT#1645:PRINT#1646:PRINT#1647:PRINT#1648:PRINT#1649:PRINT#1650:PRINT#1651:PRINT#1652:PRINT#1653:PRINT#1654:PRINT#1655:PRINT#1656:PRINT#1657:PRINT#1658:PRINT#1659:PRINT#1660:PRINT#1661:PRINT#1662:PRINT#1663:PRINT#1664:PRINT#1665:PRINT#1666:PRINT#1667:PRINT#1668:PRINT#1669:PRINT#1670:PRINT#1671:PRINT#1672:PRINT#1673:PRINT#1674:PRINT#1675:PRINT#1676:PRINT#1677:PRINT#1678:PRINT#1679:PRINT#1680:PRINT#1681:PRINT#1682:PRINT#1683
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Re: Motorola 6809 manual, on this count you rate 100..the manual stinks (compared to past publications). The price of the 6809 seems reasonable and on the software you are off. There is more useful applications software for the 6809 than any other chip in it's class. The variety is not as great but the 'quality' is there...note products advertised in these pages. I do not know of any 80XX software that will begin to compare to Microware's OS-9 or TSC's Unixflex. And these are only a beginning!!

Again Pete I appreciate your thoughts, not even all of us who are exclusive 68XX, \$50 agree among ourselves. But the one thing that has kept us a viable and GROWING group has not been the 68XX as much as it has been the \$50 bus. After all who enjoys their ice cream with mustard and horseradish?

DMW

FULL SCREEN DISPLAYS DR. E. M. PASS

For programming systems for micro computers currently provide more than primitive support for full screen (two dimensional) display and input. This is unfortunate. A two dimensional display can greatly simplify controls and improve the man machine interface in many cases. This article attempts to define the problem and offer some solutions.

Consider the display and input requirements of a simple mailing list system. For each record on the file there are approximately ten data fields. Each record is uniquely identified by a key which is arbitrarily assigned or is based upon some of the data fields in that record. A one-dimensional approach to updating an existing entry on the file would involve an interactive process of asking if each field in turn requires modification, then requesting input for the selected fields. Another one-dimensional approach would require the entry of a code word (such as "BACK") before a field is to be updated. A two-dimensional approach to the problem would involve the use of a formatted screen. All ten fields would be displayed and updates could be keyed over the fields to be changed. This is far better than human engineering than in the one-dimensional case.

There are several alternative hardware approaches to the problem of two-dimensional I/O, which may be summarized as follows:

1. ignore the problem,
2. use memory mapped video displays and keyboard inputs,
3. use "smart" or "intelligent" terminals which support formatted screens,
4. use "dumb" terminals with custom control capabilities.

It may also be properly noted in these cases in which the benefits of two dimensional display do not outweigh the additional programming time and effort usually required compared to one dimensional display and input.

The use of the memory mapped video display is increasing. Most of the "appliance" micro computers (such as TRS 80, APPLE II, PET, TI, etc.) use this technique. Because the display represents the contents of an area of directly addressable memory, changes to the screen may be made very quickly. Since the micro processor has better control over this type of display, special effects, such as multiple cursors, multiple independent subcreens, graphics, colors, blinking, multiple intensity levels, protected fields, etc. are simpler to implement on displays. For two-dimensional display purposes memory mapped video displays are generally superior to terminals, and may be less expensive in many cases.

"Smart" or "intelligent" terminals which support formatted screens are used quite heavily on main computer systems. Until recently, the cost of these terminals was prohibitive for micro computer systems. There exists very little support in micro computer programming systems for the specialized data formats required by many of these terminals for proper operations. The screen formatting capabilities of many of these terminals are being ignored for these reasons, and they are being used as "dumb" terminals. Most of the micro-computer terminals are connected to terminals. They are either direct or indirect controlled cursor movement and screen clear, and full display (non zero) mode, along with normal terminal operations. With proper programming, these terminals can be used to support two dimensional displays. As with "smart" terminals, the control functions are almost always performed with in-coded characters in the data stream, full duplex operation is required so that the computer can control the display properly.

The primary problem in using two dimensional displays on micro computers seems to be lack of programming support. Let us analyze the problem of cursor control and controlling any two dimensional display, in a high-level manner independent of hardware details.

Considering the top left corner of the display as row 1 and column 1, a field on the display may be defined by its screen number, position (column, row) length, and contents. This is the two dimensional analogue of the one dimensional case. The utility and power of two dimensional is considerably enhanced through what may be considered as field attributes. These attributes may include the following (and others, for particular displays):

- automatic only input,
- prohibited input (protected),
- intensity,
- reverse display,
- colors,
- underlining,
- etc.

In both one and two dimensional cases, the window size of a given display must be considered.

Considering the two dimensional display as a group of fields (each defined by its position, length, contents and attributes), consider a data structure which allows the definition of a high level programming aid. This aid may be used to best implemented as a set of subroutines under an existing programming system. Using this technique, fields can be defined in a table. Then the subroutines can scan the table, and using lower level device handlers and primitive functions available on the display hardware, can position the display and input process. Except for feature selection in the field attributes and window size dimensions of the display, the construction of the field table is independent of the display hardware. The input and output character strings which conversion code of the hardware dependencies may be assigned values in an initialization routine. The same field table which defines the format for the display can be used to provide the format for the input, if any, so as to use the display. Input is allowed to any field not protected. If any field is protected, the input is restricted to the digits, plus, minus, comma, and period. The data input to a field replaces the previous data on the display and is in the field table. A cursor usually designates the position on the display where a protected or undefined field is not allowed. The cursor is normally initially positioned to the beginning of the first unprotected field on the display. If the current characters on the display is not to be modified, one of the following special functions may be selected:

- cursor right,
- cursor left,

- next field,
- previous field,
- current field,
- restore cursor field,
- first field,
- error to end of field,
- insert character,
- delete character,
- transmit.

In many terminals, some or all of these functions may require the simultaneous depression of two keys. Whenever a field is completed, a common field level edit subroutine is called to allow detailed, interactive editing of each field as shown, displaying data, page numbers, social security numbers, zip codes, etc.

The device handlers perform the low level hardware dependent functions necessary to support the higher level display and input functions. For memory mapped displays, the device handlers store or retrieve data to or from the display memory, possible after consideration with horizontal and vertical retrace signals. For all types of displays, the device handlers perform the necessary input (without echo) and output operations. Because of the large number of characters on the screen modified in many cases, there will usually be a perceptible screen update time. This can be minimized for serial terminals by setting the transfer rate as high as possible.

The primitive functions use the device handlers to perform specific, elementary functions which are also hardware dependent. The following list of functions is normally performed at this level:

- set display attributes,
- reset display attributes,
- output string of characters,
- input one character,
- clear screen,
- sound alarm,
- cursor left N positions,
- cursor right N positions,
- cursor up N positions,
- cursor down N positions,
- set cursor to (column, row).

Particular hardware requirements may lengthen this list.

Two high level subroutines (screen display and screen input) are defined. They use the field tables, primitive functions, and program logic to accomplish their respective tasks. In order that a given program might have more than one screen format defined, the high level subroutines process only those fields with screen number within an externally defined range. In a data entry application, the protected fields would be defined for a different screen number from the unprotected fields. Thus the protected fields would be displayed only once and would remain on the screen, even after the unprotected fields have been reset. Other switches provide for automatic erasing of unprotected fields before input, automatic skipping to next field, and input only (error correction) operations.

Since the order of entry into the fields on the screen is controlled by the order of the corresponding field table entries, column or non sequential order of input is simple to implement. On virtually all "smart" terminals, the order is left to right, top to bottom. The field level edit capability of the input subroutine also allows for instant prior extensions, conditional protecting and unprotected of fields, and other high interactive features present in only the most "intelligent" terminals.

The operations of the high level screen display function may be summarized (in a pseudo language) as follows:

```

[=]
LOOP: [=-]
IF NO MORE FIELDS, GO TO EXIT
IF SCREEN (I) OUT OF RANGE, GO TO LOOP
GET FIELD (I) CONTENTS FROM TABLE
IF (FIELD ALL UNPROTECTED OR CLEAR FIELD BEFORE DISPLAY) AND UNPROTECTED, CLEAR
FIELD (I) CONTENTS
IF REQUESTED FOR FIELD (I), CLEAR SCREEN
SET FIELD (I) ATTRIBUTES
SET CURSOR TO (COLUMN (I), ROW (I))
TRANSMIT FIELD (I) CONTENTS TO DISPLAY
RESET FIELD ATTRIBUTES FOR FIELD (I)
GO TO LOOP
EXIT: RETURN

```

The operations of the high level screen input function may be summarized (in a pseudo language) as follows:

```

CALL SCREEN DISPLAY FUNCTION
RESET: [=-]
DIRECTION:=1
LOOP: [=-]
IF I IS NEGATIVE, GO TO RESET
IF NO MORE FIELDS, DIRECTION=-1, GO TO LOOP
IF SCREEN (I) OUT OF RANGE, GO TO LOOP
IF FIELD (I) PROTECTED, GO TO LOOP
GET FIELD (I) CONTENTS FROM TABLE
SET FIELD (I) ATTRIBUTES
SET CURSOR TO (COLUMN (I), ROW (I))
RESET FIELD POSITION POINTER
INPUT: INPUT A CHARACTER
IF CHARACTER NOT CORRECT, GO TO RESET
IF END OF FIELD INPUT, GO TO BFIELD
PROCESS CURSOR LEFT, CURRENT FIELD, NEXT FIELD, FIRST FIELD, PREVIOUS FIELD,
RESTORE CURSOR FIELD INPUT REQUESTS
IF RETURN END OF FIELD, SOUND ALARM, GO TO INPUT
PROCESS CURSOR RIGHT, ZAP TO END OF FIELD, INSERT CHARACTER, DELETE CHARACTER
INPUT REQUESTS
IF SPECIAL CONTROL CHARACTERS, SOUND ALARM, GO TO INPUT
IF RETURN END OF FIELD, SOUND ALARM, GO TO INPUT
IF NERFIC INPUT REQUESTED FOR FIELD (I), IF INPUT CHARACTER NOT NERFIC (B FLAG
OR RETURN OR PERIOD SOUND ALARM, GO TO INPUT
REPLACE FIELD (I) CHARACTER WITH INPUT CHARACTER
INCREMENT FIELD POSITION
IF NOT INPUT END-OF-FIELD OR NOT AUTOREP, GO TO LOOP ELSE CHARACTER=GET-FIELD
STORE FIELD TABLE FOR FIELD (I) CONTENTS
BFIELD: CALL FIELD INPUT
IF RETURN RETURN, SOUND ALARM, RESET TO FIELD, GO TO INPUT
IF NEXT FIELD, DIRECTION=1, GO TO LOOP
IF PREVIOUS FIELD, DIRECTION=-1, GO TO LOOP
IF NO MORE CURSORS, GO TO RESET
RETURN

```

Note that "smart" or "intelligent" terminals are treated as almost "dumb" terminals by these subroutines. Alternative formulations are possible in specific cases which make better use of particular terminal characteristics, but also limit the generality of the subroutines.

Once programming support for full screen display and input (in the form of high level subroutines, properly interfaced) has been developed, many types of application areas become much simpler to implement and to use. These include the following major areas:

48K 48K77,
8088,
word processing,
text processing,
data base entry and update,
specialist applications,
games,
etc.

This article has attempted to present a programming methodology for attacking and simplifying the problem of full screen (two dimensional) display and input on micro computers. The method involves a high level, table driven, hardware independent, set of subroutines supported by lower level, hardware dependent, primitive functions and device handlers.

September 6, 1980.
440 Evans Road.
Knoxville, Tennessee 37204.

Mr. Don Williams, Jr.
"88" Micro Journal.
3018 Hamilton Road.
P.O. Box 849.
Knox, Tennessee 37343.

Dear Sir:

Yale morning I dropped into one of the local Radio Shack stores and picked up a copy of the new TRS-80 Computer Catalog. I'd read rumors in "88" Micro Journal and other magazines about Radio Shack going to the 4809 or not going to the 4809, and I was interested in seeing what they'd done. The TRS-80 Color Computer and TRS-80 Videotex smart terminal use a 4809 and a 4847; the other TRS-80 models still use the Z-80. The TRS-80 Color Computer appears to be Radio Shack's reply to the Atari, APF and Texas Instruments home computers. The TRS-80 Videotex terminal also comes with an hour on the ComputerShare timesharing system included. Neither machine has shown up in Knoxville yet, but the specifications look good.

The TRS-80 Color Computer is built around the 6809 microprocessor and the 4847 video display generator. It comes with either 64 or 128 of dynamic memory and either 4K BASIC or 128 BASIC is ROM. Also available are a number of program packs of machine language programs in ROM: a color receiver, printer, cassette recorder, telephone modem and joystick. A disk system may be available soon. Built-in TRS-80 Color Computer hardware also include a real time clock and RS-232 serial interface. The currently available program packs include Personal Finance, Planner Commander, Football, Chessers, Chase, Mule, Bingo Bath, Pinball, and a diagnostic ROM.

The 88 Color Basic has strings, 5 place floating point arithmetic, ABS, INT, RND, SIN, COS, TAN, PERCENT, POKE, PEEK, JUSTIFY (read joystick), SET (select color) and SOUND (music through the TV speaker). The 128 BASIC has in addition TIMES (read real time clock), PRINTS (print in dollars and cents format), stronger graphics capability, program editing functions, better error messages, user defined keys and string arrays. The graphics commands compare favorably with the Apple II XL-RS routines and include size changes of the displayed shape, line drawing functions, shape rotation, shape movement, circle drawing function, rectangle drawing function, plus save and load graphics shapes.

The TRS-80 Videotex is a terminal version of the TRS-80 color computer and, judging from the catalog illustrations, has graphics capability. It comes with 16 K RAM buffer. Videotex smart terminal software (also available for the Color Computer, other TRS-80 models, and the Apple II), and a direct connect modem. The best feature is a free hour on the ComputerShare timesharing network. Radio Shack plans to, or has established its own bulletin service on ComputerShare. It appears that electronic mail is coming closer and closer.

Some of this hardware has appeared in Knoxville yet. Probably we won't see a lot of it until the Christmas shopping season is here. Once we see the stuff for real, we can have a much better idea about what's what.

Very truly yours,
Ernie Tandler
William H. Tandler

Dear friends:

After the introduction of the MC6809, having read some of the documentation on this subject, it didn't take much time to make me enthusiastic about this powerful processor. As an owner of an ITT 2820 personal computer

(the European second source for the APPLE II) soon the idea arose to expand my computer with the power of the 6809. Others have already done the same with a Z80 CPU. I am still brainstorming and I have probably not overlooked all the possibilities and/or problems. I would be glad with all the help I can get. At the same time I hope that my letter stimulates many hobbyists and professionals. If you have any suggestions or ideas, please send them to:

Jack v.d. Watering
Nieuwe Molenweg 31a
4661 SH HALSTEREN
The Netherlands

STAR-KITS

8 D 801 128
87 H&C N14 100-10349

NEWS RELEASE

The lowest-cost single-board computer system yet has just been introduced by Star-Kits, P.O. Box 109, Mt. Kisco NY 10549. The Model SBC-02 computer is a minimal 4-chip system on a 6" x 6" printed circuit board, which features a 6802 processor with 128 bytes of RAM, 2K of EPROM, and parallel or serial I/O. A wire-wrap area is provided for custom interfacing or other expansion. Because of its low cost, the SBC-02 is ideal for system development, limited-run production, and school or company training programs.

In simple quantities, the computer costs \$25 for a bare board with instructions, \$75 for a parallel I/O kit, or \$150 when wired and tested. Optionally, a machine level assembler called SBC-02 can be installed to provide program entry and control, single-stepping, breakpoints, and other front-panel functions from a serial terminal. SBC-02 runs on the 4-chip system, and is supplied separately in 2716 EPROM for \$40 (included at no charge in the kit and wired versions.)

Additional support includes extensive tutorial literature, 4K floating point basic in ROM which runs on the system, a cross-assembler for 6802 program development, SBC-02 ROMs for other 6800 systems, and consulting services.

07Sep80
4229 Estates Ct
Allison Park, PA. 15101

Don Williams, Sr.
"88" Micro Journal
P.O. Box 849
Knox, TN 37343

Someday I hope to own a "daisy wheel" printer and your servicing experience was of much interest to me.

Right now I am using a Teletype Model 43. You may be interested in the "problem" I had when I needed some work to be done on it. The machine "went dead" on a Thursday evening. Friday morning I called the service branch in Pittsburgh and was told to bring the unit in at my convenience, which I did later the same day. When I left it they were almost apologetic in saying that they doubted it would be ready before the following Monday morning. Early Monday morning I received a call telling me that it was ready. Replacement of a limit switch plus cleaning and oiling cost me \$56, billed later.

In the future, whenever I buy major new gear, adequate servicing facilities will be high on my list of priorities.

I.O. Beckwith
I.O. Beckwith



August 8, 1980

New Product Release: SIM80

LSI Enterprises is pleased to announce its newest product, SIM80. SIM80 is an 8080/8085 simulator that executes 8080 machine language programs directly without modifications. It is an "interpreter" written in 6809 and 6800 machine code. It is approximately 2 - 10 times slower than an 8080 running at similar clock speeds. It executes all of the 8080 code.

SIM80 also allows the user to call 6800 or 6809 code for applications requiring tight timing or for servicing I/O drivers in real time. This is done by utilizing an unused 8080 opcode.

Interfacing SIM80 is also simple. All that is required of the user is to supply three vectors for console input, output and monitor or operating system entry.

SIM80 is available on MC tape or Parcom diskette for \$34.95. It will also be available on Plex 2 diskette on November 1, 1980 for the same price.

May 20, 1980

'68 Micro Journal
3014 Main St.
Knox, Tenn. 37345

Dear Mr. Williams:

I am writing this letter to applaud a little known supplier of SS-50 boards. Walter Wimberly, 2914 Sunrise Dr., Orlando, Fla. 32803. Walt offers a 16K EPROM and now a 16K RAM card for this bus. Each has complete address decoding and so can be addressed into the upper 32k of memory.

I first purchased the EPROM board from Walt and was pleasantly surprised by its quality and documentation. This board is divided into four 4K byte blocks each independently addressable on any 4K boundary. It takes 2708's, 1K by 8 multi-voltage EPROMs, addressable anywhere in memory that isn't previously occupied. I use it, among other things, for my modified version of SWBUG at \$E000.

I just found out about and have bought Walt's most recent offering, an SS-50, 16K RAM card which uses 2114's. I am delighted. This card is organized as two 8K blocks each independently addressable to an unused 8K boundary anywhere within a 64K system.

The quality of the design and the board itself are excellent and I, for one, am very pleased with my investment.

This letter is intended to "spread the word." We have another source of SS-50 boards. There's another good guy with good products and I want to point him out.

Sincerely,
Dan Grostick
Dan Grostick
21565 Plum Rd.
Boca Raton, Fla. 33433

TRANSFER SWTP 6800 COMPONENTS TO SWTP 69/K

Dan Grostick
21565 Plum Rd.
Boca Raton, FL 33433

I have been successful in transferring my 6800 based I/O and memory components to the new SWTP 69/K mainframe running FLEX 9 Version 2.6. I want to share my experiences with others considering this move.

OVERVIEW

I had been running FLEX on a SWTP 6800 with 40K of memory, a MP-L parallel interface, a MP-S serial interface, a MP-R eeprom programmer, and a DC-2 mini-floppy controller.

There are two significant changes that should be noted when transferring any I/O device to the 69/K with the new MP-B3 motherboard. Each port now has 16 addresses as compared to 4 addresses in the 6800 MP-B3 and MP-B2 motherboards. This is accomplished by dedicating the UD3 and UD4 as the additional addressing lines (now RS2 & RS3 respectively). Also the +-12 volt inputs now supply +-16 volts.

MP-L, MP-S, MP-R, DC-2

The MP-L, MP-S and MP-R will plug into the slots without modification. The DC-2 does use the 16 volt input but is not affected by the increased voltage. The DC-2 mini-floppy controller is not directly compatible with the new motherboard as it was designed to be decoded on port 3 & 6 on the 6800 motherboard.

A relatively simple modification requiring one 7400 IC and a few wires can be easily installed to provide the necessary decoding. First two lands must be cut. Position the DC-2 controller bottom side up with the J2 30 pin connector towards you. Cut the leftmost land (UD3 - the CS6 input) between J2 and the first feedthru. Next turn the board over and locate the leftmost land on the top side (I/O port select) and follow it to the first feedthru. Turn the board over and cut the I/O select line at the short land located between R12 and D2. Mount the IC (a 7400) piggyback on IC11 (soldering up all legs except pins 7 & 14 which should be soldered to IC11). Connect the new IC as shown in Figure 1.

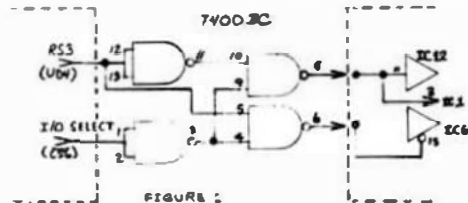


FIGURE 1

DAN GROSTICK 305-3251464		
21565 PLUM RD 305-7411864		
BOCA RATON FL 33433		
SIZE	DRAWING NO.	REV
A	DC-2 MODIFICATIONS	-
	SHEET 5 OF 5	LTR

Note that the inputs are CS6 (I/O port select) and RS3 (MP-B2 UD4), not the previously used UD3. The outputs from the chip may be connected to the feedthrus inboard from the cut lands. Double check your wiring and plug the modified controller into port 1 as required by FLEX 9. Note that the DC2 board uses zener diodes to regulate inputs from the +-16 volt supply and is not affected by the increased voltages from the new power supply.

MEMORY

The SWTP MP-MP 4K memory, MP-BM 8K memory, and the Digital Research 16K static memory cards do not require any special modifications for the 69/K.

69/K GENERAL COMMENTS

SWTP should be complimented on a well designed and implemented package that allows a reasonable level of compatibility with previous products. The most significant shortcoming is a very noisy cooling fan that drowns out any chance of silence. S-BUG has an improved user interface as compared to the previous monitors. FLEX 9 Version 2.6, although lacking any multitask capability, offers an excellent price / performance ratio.

CONCLUSION

Transferring existing components to a new system is a cost effective way to upgrade without losing existing capability. In consideration of the economics, the move to a 6809 system did not cost much more than upgrading with a MP-B3 processor card. The sale of the 6800 system plus the cost of a MP-B3 was close enough to the cost of the new system to justify the move.

volset

When your disk library gets as large as mine with nearly a hundred mini-floppies, there is often a need to change the volume names and or serial numbers of disks without having to reinitialize them. VOLSET was written to do just this.

FLEX disks have a System Information Record which contains information concerning disk space for FLEX useage and the volume name and serial number. The volume name and serial are not used by FLEX at all so changing them is quite safe.

There is a FLEX function to open and read the SIR but its method of use is not entirely clear from the documentation so I chose to do single sector I/O directly on the SIR.

The actual makeup of the SIR is in fact best described in the 6809 adaption guide. The offset for the volume name is 16 decimal bytes and the serial number 27 bytes. The volume name is in ASCII but the number is in BINARY. The number therefore has a maximum value of 32767. My system has two drives and I use drive 1 as the work disk all of the time. I fixed the drive for VOLSET to 1 for this reason and also I think that changing the system disk SIR could, under certain situations eg spooling, be dangerous.

The command format is:

VOLSET, (NEWNAME), (NEWNUMBER).

The fields NEWNAME and NEWNUMBER are optional and if either field is invalid then no changes will be made to that field. The actual program is straightforward and the listings are sufficient for the description of operation. The conversion to FLEX09 is just a matter of changing a few addresses and submitting the source to the TSC 6809 assembler which will automatically convert 6800 instructions to 6809 equivalents in flight.

Finally, I recently reassembled the PROT command to allow files to be set to read protect and also displayed as having read protect on. The problem is that even if the read protect bit (bit 5, byte 15 in FCB) is on then FLEX ignores it. I have not discovered the exact mechanism employed by FLEX to check for read protected files, but if

the instruction at location \$89C3 is replaced by 2 NOP's then the file will be checked for read protect and the appropriate error message reported. The problem with this patch is that once a file is read protected then the PROT

command will not allow the status to be changed as the file is read protected. The PROT command could be made to temporarily alter \$89C3 to \$2706 to enable read protection to be removed. There are a number of tests and switches in FLEX which appear to be connected with file protection one of these is \$B41A which is tested before the read protect test is made.

NAM VOLSET

```

* THIS PROGRAM WILL ALLOW THE USER TO ALTER
* THE DISK NAME AND OR NUMBER WITHOUT HAVING
* TO REINITIALIZE THE WHOLE DISK.
*
* (COMMAND FORMAT : VOLSET, (NEWNAME), (NEWNUMBER))
* IF NEWNAME OR NEWNUMBER ARE NULL THEN THEY
* WILL NOT BE CHANGED.
*
* DRIVE NUMBER IS FORCED TO 1 AS CHANGING THE SIR
* ON DRIVE 0 IS RISKY UNDER CERTAIN CONDITIONS.
*
* AUTHOR : DAVID BOBBY
* WRITTEN : 26/8/80
* UPDATED :
*
*
* SYSTEM EQUATES
*
A100 CODE EQU $A100 UTILITY AREA
A840 FCB EQU $A840 SYSTEM FCB
*
* CONSTANTS
*
0001 DRIVEN EQU 1 FORCE DRIVE 1
0009 READS EQU 54 READ SINGLE SECTOR
000A WRITES EQU $0A WRITE SINGLE SECTOR
*
* FCB LOCATIONS
*
0000 FUNC EQU 90 FUNCTION CODE HERE
0001 ENCOD EQU 91 ERROR BYTE
0003 DRIVE EQU 93 DRIVE NUMBER 0-3
0004 TRACK EQU 90 CURRENT TRACK
001F SECTOR EQU 31 CURRENT SECTOR
A880 SECNUM EQU FCB+840 DATA PORTION OF FCB
*
* SYSTEM INFORMATION RECORD OFFSETS
*
0010 VOLNAM EQU 16 VOLUME NAME (11 CHARS)
001B VOLNUM EQU 27 VOLUME NUMBER IN BINARY (2 BYTES)
*
* OFFSETS IN FCB
*
A898 NAME EQU SECNUM+VOLNUM LOCATION OF VOLUME NO.
A890 NAME EQU SECNUM+VOLNUM LOCATION OF VOLUME NAME
*
* FLEX SUBROUTINES
*
A083 WARMPS EQU $A083 WARM START FILE
B404 FMS EQU 98 06 FILE I TRY POINT
A048 INDEC EQU $A048 GET DECIMAL NO IN 1
A020 GETTIL EQU $A020 GET FILE SPC
*
* MAIN PROGRAM
*
A100
A100 20 15 START ORG CODE START
A102 01 VERS FCB 1 VERSION NUMBER
A103 XTMP RMB 2 TEMP SAVE AREAS
A105 XTMP1 RMB 2
A107 00 FLAG FCB 0 UPDATE FLAG
*
* PSEUDO FCB FOR GETTIL
*
A108 PFCH RMB 4
A10C PFNAM RMB 8 FILE NAME PUT HERE
A114 00 FCB 0:0:0 CLEAR EXTENSION FIELD
A115 00 00
*
A117 CE A8 40 START: LDI 4FCB GET SIR FIRST
*
A11A B6 09 LDA A READS 55 READ OP CODE
A11C A7 00 STA A FUNC,X
A11E B6 01 LDA A DRIVEN FORCE DRIVE NUMBER
A120 A7 03 STA A DRIVE,X
A122 B6 00 LDA A TRACK 0
A124 A7 1E STA A TRACK,X
A126 B6 03 LDA A SECTOR 3
A128 A7 1F STA A SECTOR,X
A12A B0 B4 06 JBR FMS GET SECTOR
A12D CE A8 90 LDX NAME NAME FIELD IN SIR
A130 FF A1 05 STX XTMP1
*
* READ NEW VOLUME NAME
* IF VOLUME NAME IS A NULL ENTRY OR IT IS INVALID
* THEN IT WILL NOT BE CHANGED.
*
A123 CE A1 08 LDX EPTCH PSEUDO FCB
A136 B0 AD 20 JBR CITT IL GET NEW NAME
A138 25 1D BCS CACHIN WAS NAME OK ?
A138 CE A1 0C LDX PFNAM YB IT WAS
*
* MOVE NEW NAME INTO SIR FROM PSEUDO FCB
* NO OF CHARS IN NAME
* GET CHAR
* POINT TO NEXT
*
A13E CA 08 LDA B 111
A140 A6 00 PLOP1 LDA A 0,X
A142 08 INX
A143 FF A1 03 STS XTMP
A146 FE A1 05 LDX 1 EPT1
A149 A7 00 STA A 0,X PUT NAME INTO SIR
A14B 08 INX
A14C FF A1 05 STX XTMP1 POINT TO NEXT
A14F FE A1 03 LDX XTMP1 CLT SOURCE FIELD
A152 5A DEC B JUMP COUNT
A153 26 18 BNE PLOP1 LOOP TILL DONE
A155 7C A1 07 JAC FLAG SET UPDATE FLAG
*
* CHANGE DRIVE NUMBER
* IF NEW VOLUME NUMBER IS NEITHER VALID NOR
* PRESENT THEN NUMBER IS UNCHANGED.
*
A15B B0 AD 48 CHNAM JBR INDEC GET NEW VOLUME NUMBER
A15D 25 09 BCS FINISH NUMBER NOT VALID
A15D 5D TST B CHECK FOR REPEATOR

```

```

A15E 27 04      SIO FINISH
A160 1F AB 99    INC FLAG      NEW NUMBER
A163 7C A1 07    * WRITE OUT NEW CIR IF CHANGE FLAG IS NON ZERO
A166 7B A1 07    FINISH TST FLAG      SKE IF WRITE IS REQUIRED
A169 27 0A      BEO MDACT      DONT BOTHER
A16B 84 0A      LDA A LWRITES    SET FCB TO WRITE
A16D CE AB 40    LDX EFCB
A170 A7 00      STA A FUNCT.H
A172 8D 04 06    JSR FMS        WRITE OUT UPDATED CIR
A175 7E AD 03    NDACT JMP WARM8    THATS IT
                    ZND START

```

NO ERROR(S) DETECTED

SYMBOL TABLE:

ADDRESS	CODE	ALOC	DRIVE	0003	DRUM	0001	ERROR	0001
FCB	A840	FINISH	A166	FLAG	A107	FMS	B406	FUNCT
GETFIL	A820	INDEX	A048	NAME	A870	NDACT	A175	NUMF
PTCB	A104	PFNAM	A10C	PLOP	A140	READS	0009	SECDEF
SECTOK	001F	START	A100	START	A117	TRACK	001E	VERS
VOLUME	0010	VOLUME	001B	WARM8	AD03	WRITES	000A	XTMP
XTMP	A105							

The attached program, PULSE2.TXT, may be of interest to some readers who are all thumbs where hardware is concerned.

The program uses the CB2 line of a 8820 PIA to generate some pulses. The length of time the output is high or low is variable and selectable. The main work section is LOOP. It operates by setting bit 3 high and then low (lines 56 & 61). The length of time CB2 is on or off is determined by the HEX values you select during SETUP. As you observe the waveform on a scope you may reset the variables if you enter the ESC key.

HELP - HELP - HELP - HELP - HELP

Problem with 888 ASMS. - Only works if Option 8 (no creation of binary file) is selected. Error codes generated 0100, 08 and sometimes 0303. Binary file is loaded in directory but with 0000 at beginning and ending track and sector.

Please send me your solution in 100 bytes or less. Thanks.

Gene Ebray
Route 1 Box 151-M
Harrisville, NC 27580

```

8050 88 8003 80: LDA A CRB
8053 84 F7 81: AND A #11110111 make level zero
8055 87 8003 82: STA A CRB
8058 F6 8003 83: LDA B TIMEOF
805B 8D 11 84: BSR MILDLY
8060 88 8004 85: LDA A CTRL check for a break
8064 44 86: LSR A
8067 24 08 87: BCC AGAIN no break from keyboard A 1A
8069 86 8005 88: LDA A CTRL+1 set the input
806B 81 88 89: CMP A #8C
806D 26 02 90: BNE AGAIN
806A 20 A7 91: BSA SETUP
806C 20 D5 92: AGAIN BRA LOOP
806E FE 8004 93:
8071 08 F8 94: MILDLY LOX MIN
8072 26 F8 95: DELI DEX
8074 5A 96: BNE DELI
8075 26 F7 97: DEC B
8077 28 98: BNE MILDLY
8079 99: RTS
807A 34 80:
807B 08 81:
807C 08 82: MESON FCC /Time unit for +5 volts = /
807D 00 83: FCB 0
807E 54 84: MESOFF FCC /Time unit for around state = /
807F 00 85: FCB 0
8080 54 86: DURAT FCC /Time Expanding Factor = /
8081 00 87: FCB 0
8082 00 88: END

```

NO ERR RIB DETECTED

SYMBOL TABLE:

ADDRESS	CODE	DATA	0047	BYTE	E055	CTRL	8004
CRB	8003		8002	DDRB	8002	DELI	8071
DURAT	8080	ESC	0098	INIT	8008	L OP	8043
MESOFF	8082	MESON	8078	MILDLY	808E	NIM	8004
SETUP	013	TIMEOF	8003	TIREON	002	ZCALF	D2DC
ZINCH	D200	ZOUTST	D2A6				

D.V. GOADBY
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713-1430 First St. East
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Canada K6M 4H1
Nov 30, 1980

68 Micro Journal
3818 Hamill Road
P.O. Box 849
Nixson, Tennessee
U.S.A 37343

Dear Sirs:

I am very satisfied with a product advertised in your magazine, and would like to pass my comments on to your readers.

DYNASOFT Systems PASCAL was shipped promptly and set all advertising claims. It is very compact and easily usable on a small system with only a single cassette. The manual is very good, but does seem some basic knowledge of PASCAL. Included is an interesting sample test program that runs well.

The whole PASCAL system resides in memory at once and consists of (from the bottom up) of the P-code interpreter, supervisor, editor and compiler. From there up is workspace. The editor allows you to write the source into the workspace, which can be saved after returning to the supervisor. The compiler can then be run to convert the source to P-code in the workspace. The supervisor can then start the execution of the user P-code.

A nice feature is the ability of the supervisor to move the user P-code down to the area occupied by the editor and compiler resulting in a much smaller "run-time" package.

This PASCAL can manipulate 8 bit bytes and 16 bit integers in external memory (even I/O devices) by use of a POINTER type. This combined with the ability to call and pass parameters to machine language routines provides a lot of power. I also found that the P-code execution did not seem to mind running with interrupts enabled and handled by machine language routines.

All these features combined with the manual's information for adapting to any hardware configuration make this a handy package for small control applications - even if you already have a disc based PASCAL.

Maybe enough interest in Mr. Jost's software will encourage him to add REAL, about the only thing missing from this PASCAL.

Sincerely,

Eric Pierce C.E.T.

PULSE2.TXT SSB MNEMONIC ASSEMBLER PAGE 1

```

1:      NAM      PULSE2.TXT
2:
3:      * This will use CB2 to generate pulses.
4:
5: 8003      5: CRB      EQU      #8003
6: 8002      6: DDRB     EQU      CRB-1
7: 8002      7: DATA    EQU      DDRB
8:
9:      * 88-808 equates
10:
11: D2DC      11: ZCALF    EQU      #D2DC
12: D2A6      12: ZOUTST   EQU      #D2A6
13: D2B9      13: ZINCH    EQU      #D2B9
14:
15:      * 88B80 equates
16:
17: E055      17: BYTE     EQU      #E055
18: E047      18: BADDR    EQU      #E047
19:
20:      * Program constants
21:
22: 0088      22: ESC       EQU      #88      stop the generator
23: 8004      23: CTRL      EQU      #8004
24:
25:
26: 8000      26: ORG        EQU      #8000
27:
28: 8000 20 04 28:          BRA      INIT
29: 8002      29: TIMEON    RMB      1
30: 8003      30: TIMEOF    RMB      1
31: 8004      31: RIN       RMB      2
32:
33: 8008 88 8003 33: LDA A CRB
34: 8 8 84 F8 34: AND A #8F8
35: 8008 87 8003 35: STA A CRB
36: 800E 88 34 36: LDA A #2001101000 configuration
37: 010 87 8003 37: STA A CRB
38:
39: 8013 8D D2DC 39: SETUP JSR ZCALF
40: 8016 CE 8078 40: LDX #MESON
41: 8018 8D D2A6 41: JSR ZOUTST
42: 801C 8D E055 42: JSR BYTE
43: 801F 87 8002 43: STA A TIMEON
44: 8022 8D D2DC 44: JSR ZCALF
45: 8025 CE 8082 45: LDX #MESOFF
46: 8028 8D D2A6 46: JSR ZOUTST
47: 802B 8D E055 47: JSR BYTE
48: 802E 87 8003 48: STA A TIMEOF
49: 8031 8D D2DC 49: JSR ZCALF
50: 8034 CE 8080 50: LDX #DURAT
51: 8037 8D D2A6 51: JSR ZOUTST
52: 803A 8D E047 52: JSR ADDR
53: 803D FF 8004 53: STX MIN
54: 8040 8D D2DC 54: JSR ZCALF
55: 8043 86 8003 55: LOOP LDA A CRB
56: 8046 8A 08 56: ORA A #100001000 make level one
57: 8048 87 8003 57: STA A CRB
58: 804B F6 8002 58: LDA B TIMEON
59: 804E 8D 1E 59: BSR MILDLY

```


68' Micro Journal
3018 Hamill Rd.
P.O. Box 849
Hixson, TN 37343

Dear sirs,

I have developed some software in BASIC which:

- 1) will print an messe to companies in DATA statements
 - a) for a cover letter
 - b) for an envelope
- 2) will search for a particular company
 - a) for a cover letter
 - b) for an envelope
- 3) will provide a complete listing of one's personal belongings entered in DATA statements
- 4) will search for an item, manufacturer or value greater than that entered

These programs provide hard copy to port 7 using MiniFlex BASIC.

While there is nothing unusual about these programs I would like to know if such programs can be copyrighted as I was thinking of selling them for \$10.00 for a version on floppy. It might save someone hours writing the programs and just involve the keyboard slavery of entering DATA statements.

Does anyone know where to insert jump to routines in Dyna-Soft PASCAL for printer driver routines?

Thank you,
Jeffrey M. Craig
Jeffrey M. Craig
Apt. 912 - 3001 S. King Dr.
Chicago, IL 60616

HELP!

Does anyone know of the availability of a program, running under SSB 6809 DOS69, that will read FLEX files and convert them to SSB DOS format? Has someone figured out how to make the SSB TEXT PROCESSOR provide vertical page centering for letters?

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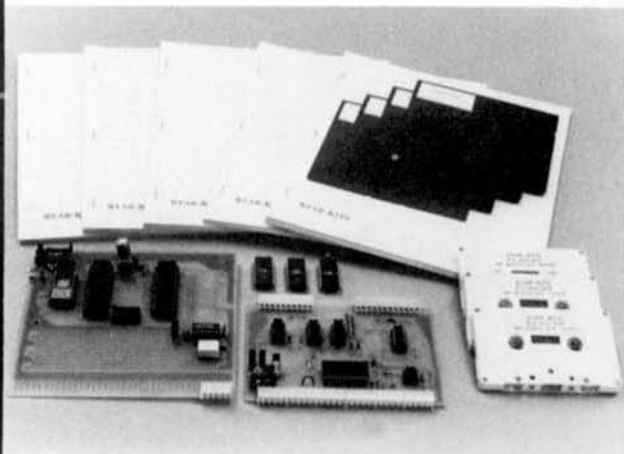
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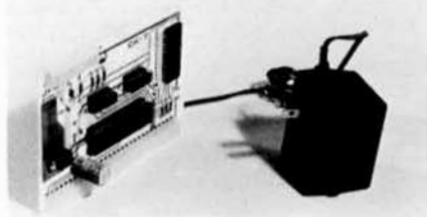
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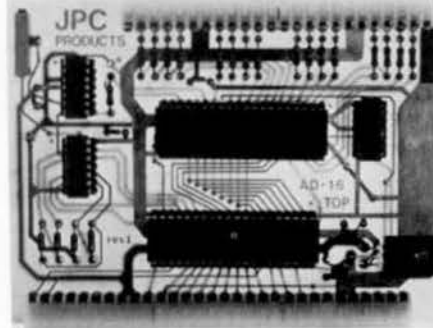
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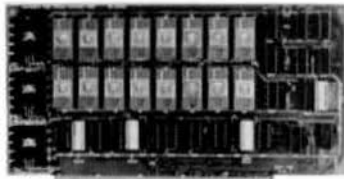
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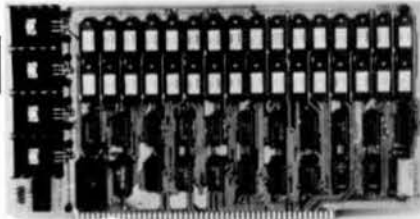
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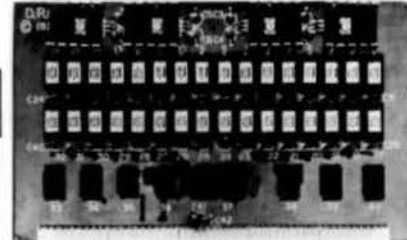
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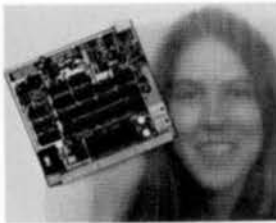
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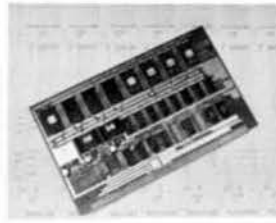


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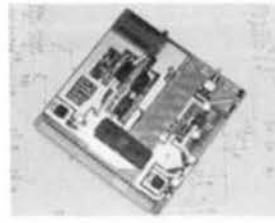
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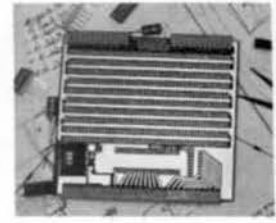
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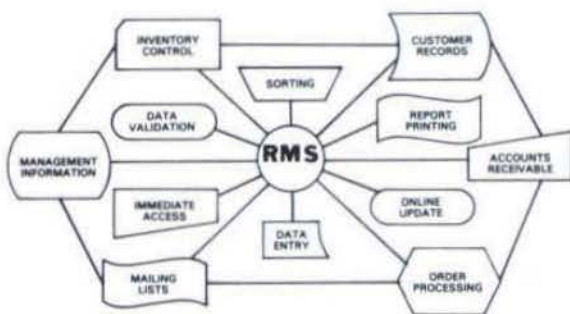
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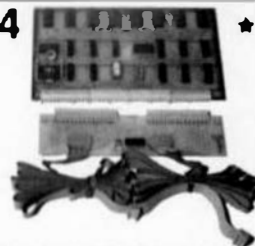
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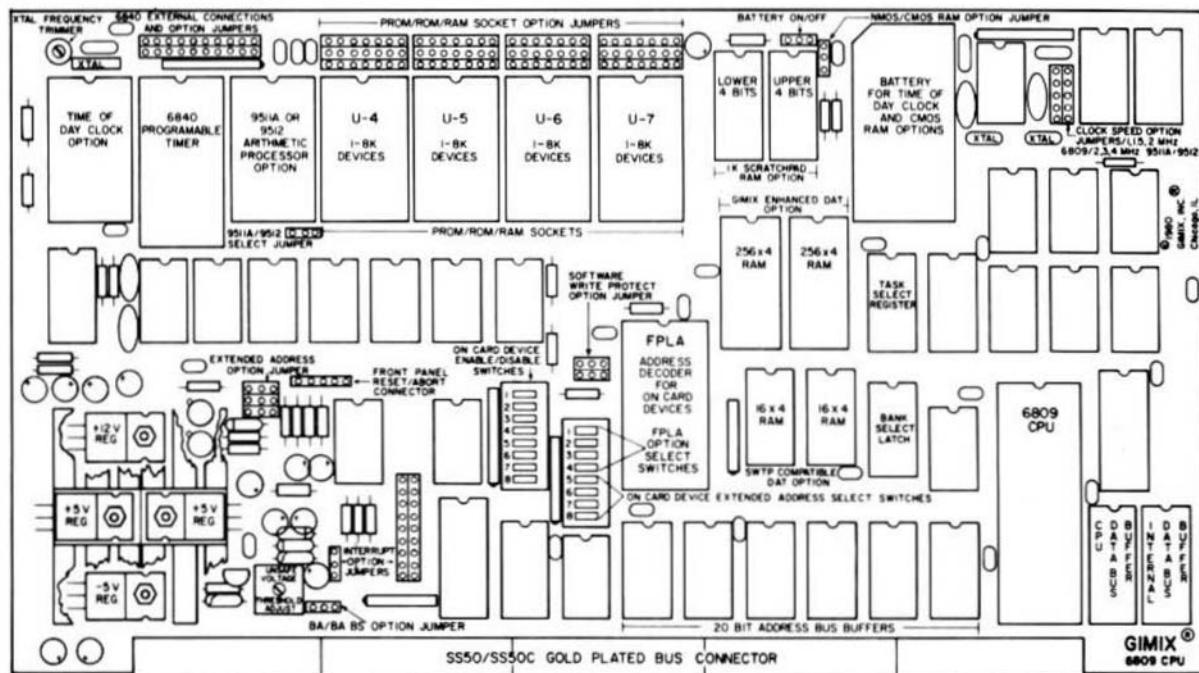
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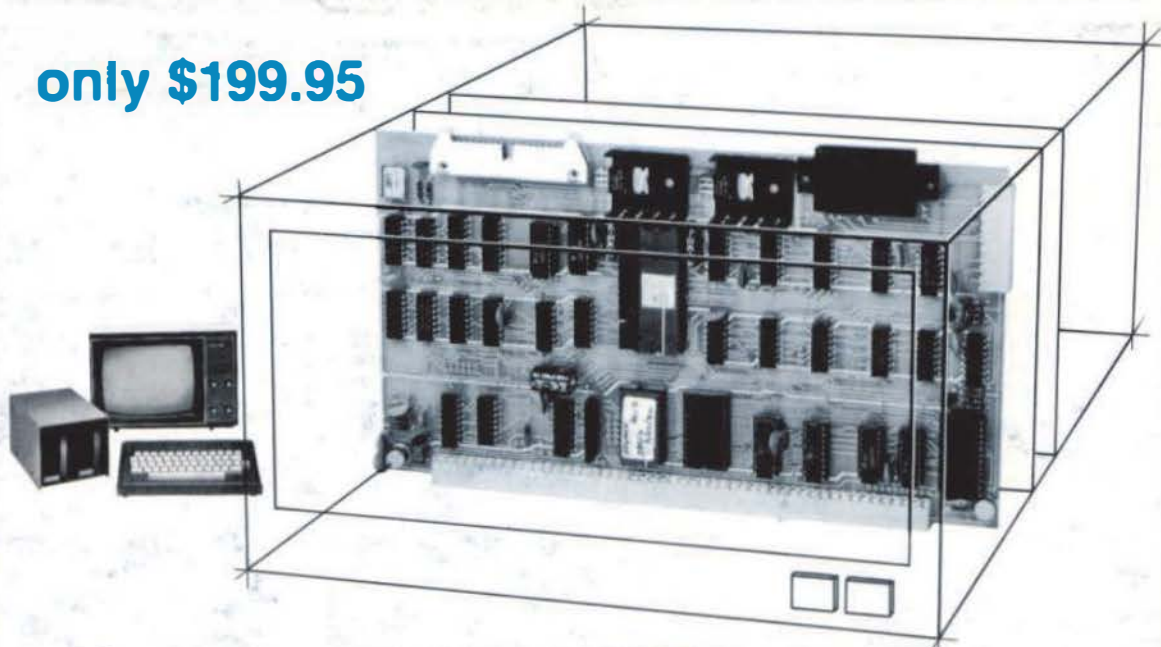
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